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Full Name of Author — Nom complet de l'auteur

KENNETH R. BODDEN

Date of Birth — Date de naissance	Country of Birth — Lieu de naissance
MAY 30, 1953	CANADA

Permanent Address — Résidence fixe

10107 B - 87 AVE EDMONTON ALTA T6E 2P3

Title of Thesis — Titre de la thèse

The Economic Use by Native Peoples of the Resources of the Slave River Delta

University — Université

UNIVERSITY OF ALBERTA

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

M. A.

Year this degree conferred — Année d'obtention de ce grade	Name of Supervisor — Nom du directeur de thèse
1981	DR. R.G. IRONSIDE

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September 25/81	Ken R Bodden

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The Economic Use By Native Peoples of the Resources of the Slave River Delta

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF Master of Arts

IN

Geography

Faculty of Graduate Studies and Research

EDMONTON, ALBERTA

Fall 1981

THE UNIVERSITY OF ALBERTA

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(SIGNED) Ken R. Bodden

PERMANENT ADDRESS:

10107B - 87 Ave
EDMONTON ALTA
T6E 2P3

DATED September 25 1981

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled The Economic Use By Native Peoples of the Resources of the Slave River Delta submitted by Kenneth R. Bodden in partial fulfilment of the requirements for the degree of Master of Arts in Geography.

R G Ironside

Supervisor

William C. Wonders

A D Fisher

Date Sept. 21st 1981

Abstract

The failure of past research on northern native communities to measure the economic value of country food produced by the domestic economies (hunting, trapping, fishing) has led to the false conclusion that the economic sector generated by traditional lifestyles is of minor importance compared to the wage employment and social assistance sectors of northern community incomes.

This study attempted to prove that natural resources harvested from the Slave River Delta are economically important to the community of Fort Resolution. In addition, the research attempted to prove that resource harvesting is concentrated during times of periodic resource abundance and the resulting heavy harvesting pressure may cause deterioration of more sedentary wildlife resources through overharvesting. The objectives of this thesis were to record the actual harvest of resources from the delta, record harvesting techniques and specific resource areas, document resource utilization, assign an economic value to the resource harvest and to compare the resource harvesting sector to the other sectors of the local economy where possible. The importance of the traditional lifestyles was examined in relation to the wage employment sector to enable observations to be made on the future of traditional activities in the community.

Indirect and direct observations were used in conjunction with semi-structured interviews to obtain the desired information on the harvest of natural resources, techniques and their utilization. Government documents were used to check the accuracy of interview results. Natural resources produced were assigned retail market values

in dollars by substituting the cost of locally available imported food stuffs.

The 1975-76 harvest season (July-June) generated $129,162.59 worth of country food for both human and animal consumption. Muskrats, moose, snowshoe hares and ducks accounted for most of the human food value, while muskrats and fish represented the major portion of animal food by dollar value. The total estimated value of production including furs was $222,367.74. The value of country food harvested in 1976-77 was slightly lower than the previous year at $108,864.51. Muskrats and hares provided most of the human food value while most of the animal food value was represented by muskrats and fish. Total estimated production including furs was $192,814.08. Despite an annual outfitting cost of $1,164.00, individual households had an average net income of $1,016.07 and $726.33 in 1975-76 and 1976-77 respectively.

The income generated by natural resource harvesting activities in the Slave River Delta in 1975-76 accounted for approximately 35.6 percent of the total community income. This value ranked above both the wage employment (32.6%) and social assistance payments (13.1%). The value of country food exceeded also, the value of the fur taken from the delta. In 1976-77, the percentage of the total community income represented by the delta's production (27.5%) was less than the wage employment sector (42.7%) but greater than the social assistance sector (13.3%). As in 1975-76 the value of country food exceeded the value of the fur harvested from the delta.

Acknowledgements

Completion of this thesis would not have been possible without the cooperation of a great number of people and institutions, whose help I gratefully acknowledge. I especially thank my thesis advisor, Dr. R.G. Ironside, for his constructive criticism, patience and general support throughout the research and writing of this thesis. Special mention should be made of the academic and moral support provided by the late Dr. Don Gill.

The people who have made the most significant contribution to the study are the residents of the Fort Resolution area. Special thanks are extended to Father Lou Menez, Gabe Lafferty and family, Angus Delorme and family and Pete and Christine King and family. Valuable cooperation and assistance was also extended by the Fort Resolution Settlement Council, the Band Council and the Hunters and Trappers Association. A sincere thank you is extended to all the residents of Fort Resolution who made their community my home for more than two years. Their support and desire to save what they treasure has encouraged me to persevere with this project.

Government departments which have contributed to this work include the Government of Northwest Territories Game Branch and the Science Advisory Board, which funded a local student, Harry Beaulieau, to serve as a field assistant. The Hudson's Bay Company assisted greatly by opening its records to me.

Financial assistance for the research has been contributed by the Inland Waters Directorate, Department of Environment, which funded the outfitting and maintenance of the research camp in the summer of 1977; the Department of Indian Affairs and Northern Development, which funded the winter research in 1977-1978; and the Boreal Institute for Northern Studies which funded the hiring of Angus Delorme as a field assistant. Special thanks is extended to the staff of the Boreal Institute for their moral support and for employing me for the past two years while this thesis was being completed.

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INTRODUCTION

1.1 Justification

The attractiveness of wage earning employment in the north has been partially blamed for the loss of traditional skills and life styles. The importance of the domestic economies (hunting, trapping, fishing) has been evaluated in a number of studies and reported to be insignificant or of minor importance, particularly in the face of declining fur markets, low fish prices and problems of resource accessibility. Nevertheless, conclusions and projected trends have been drawn from the documentation, that may be erroneous and which certainly, therefore, invite comment. Most of the work was completed at a time when fur prices were depressed resulting in poor economic returns. If the current rise in fur prices and the high cost of imported foodstuffs result in a greater or stabilized level of use of natural resources, the situation should be documented and reassessed. [1] Accurate natural resource production figures can be assigned economic or market values, and the quality of life in the North in economic terms can be placed on a more realistic basis for comparisons with southern situations. The quality of life may include an assessment of how renewable resources contribute to the economic welfare of native people, being indicative of personal or social well-being rather than in the popular sense of subsidy.

---

[1] Fur prices for mink, muskrat and long-haired furs such as lynx and coloured fox had risen by 1974 to two to three times their 1970 values.

The Slave River Delta is an ecologically sensitive, and still a relatively unstudied wetland area in the Northwest Territories. As a consequence, research initiated now will provide a basis for evaluation of future environmental modification. Possible industrial developments such as hydro-electric power development on the Slave River, have the potential to directly modify the environment and also, indirectly the economics of harvesting the resources of the delta.

1.2 Literature Review

1.2.1 Pre Contact Period

Until the early 19th century or contact with the whiteman, the Athapaskan-speaking Indians were basically hunters and fishermen. Their subsistence was based on the harvest of a variety of bush resources, from big game such as moose and caribou, to small game like ptarmigan and hares. Fish were taken with gill nets, fish traps and weirs. Diets were supplemented by the addition of waterfowl products, and to a lesser degree berry crops. Forest products were used for shelter and fuel.

Local periodic resource scarcity was usually offset by concentrations of resources in alternative areas. Successful harvesting was dependent on accessibility to known stable concentrations of game animals and fish, as well as detailed and specialized knowledge of their environment. The regional economy in the late aboriginal period was a self-sufficient economy in terms of production and circulation of goods. Native peoples were totally dependent upon their own efforts for their own survival.

1.2.2 Contact and Subsistence Decline

Natives in the North became involved in the fur trade in the early 1800's. Contact with white fur traders was limited in the early development stages and the native economy was not affected to any significant degree. Gradually, however, increased participation in the trade led from the pure subsistence system to increased dependence on trade goods and an acceptance of a monetary system. By the end of World War 1, there had been a definite economic shift, from the pure subsistence system to the fur trade and market economy, such that trade goods were significant in their economy along with local subsistence goods. The former "total economy" was transformed into a two part economy (Asch 1976a).

The significance of subsistence activities in the native economy has been substantially modified. Documentation of economic decline has been extensive. Research done in communities of the North between 1950 and 1970 by Buckley (1962), Usher (1965), Nelson (1973) and Rodger (1973), showed decreased utilization of natural resources. Indeed, Van Stone (1974) noted the decline as early as 1930.

The rise in seasonal wage employment coupled with general declines in the populations of fur-bearing and game animals, have led to a gradual decline in traditional activities in response to the reduction in subsistence activities. Dog numbers dropped in response to the reduction in subsistence activities, compounding conditions which further eliminated the need for the majority of the fishing activities. From 1930 until 1965 the prices for furs fluctuated at a much lower price than the pre-1930 values, and fur trading posts shifted to being retail outlets. This marketing shift led to increased dependence on manufactured goods despite drastic increases in product prices during the same time period. The New Education Programme of 1955 established education and health facilities in the small communities, and as a result families spent more time in the settlements. The Roman Catholic and other churches were influential in creating a more sedentary lifestyle. As a result of these influences, large resource areas formerly used intensively, were abandoned or used less frequently. Limited employment opportunities and reduced trapping incomes have created a situation where a significant proportion of incomes is generated now by welfare and government transfer payments (Phillips and Hetland 1971; Palmer 1973).

The collapse of the fur trade in the 1950's, and the subsequent reduction in cash payments, have forced natives to turn to alternative income supplements. Van Stone (1974:113) suggested that "increased exposure to information concerning the white man's standard of living, has raised the level of Indian consumer aspirations considerably. It is becoming abundantly clear that these aspirations cannot be satisfied by their economic base as it now exists. Since the majority of Athabaskans no longer depend exclusively on the land as a source of subsistence and have lost much of the knowledge of the environment and how to exploit it, they are approaching a condition in which they are no longer adequately equipped to live in their ancestral territories."

Based on the situation prior to 1970, researchers have tended to paint a rather gloomy picture of traditional activities and economies. Two dominant positions can be established from reports such as those presented by the Boreal Institute of the University of Alberta, Gemini North, and Van Ginkel Associates Ltd. at Arctic Gas Pipeline Hearings in 1974. One position is that the present economic and social situation is characterized by high unemployment rates, high welfare payments, and poor housing. These social problems can not be solved through the traditional way of life as it is dead or dying.

The second position is that this picture of despair for the traditional economies is not completely substantiated. Recent research in the North has shown that country produce does continue to play a significant role in the native economy (Usher 1971a; Asch 1976b; Rushforth 1976). Differences between these two analyses and conclusions can be traced to fundamental differences in approaches, with the more recent studies in the 1970's recognizing the importance of associated historical and cultural factors. These later studies (Asch 1976; Rushforth 1976) stated that the bush economy is not dying and in fact country foods remain a significant subsistence source for both a substantial amount of income and of diet so that most native people eat well off the land (Berger 1977). A large proportion of natives still engage regularly in traditional land-use activities. For the past five to ten years no general decline in land-use activities has been recorded (Rushforth 1976). The use of country food is virtually as high in the largest center as in the smallest (Asch 1976b).

This stabilization of the traditional subsistence sector is supported by work by Gourdeau (1974), and Van Stone (1974). Palmer (1973:45) concludes that the "traditional way of life (hunting, trapping and fishing), still plays an important role in the northern economy".

Despite increased pressure from governmental and industrial organizations to adopt more of the whiteman's ways, especially wage employment, the natives have maintained the independence of the two forms of livelihood, one based on the bush and the other on the industrial and commercial economy, giving them in effect a dual economy. An important point emphasized by Van Stone (1963) was that trapping was always secondary to hunting, a more popular activity which is undertaken upon any excuse. The decline in trapping activity due to depressed markets does not require a corresponding decline in hunting and fishing activities to provide the natural resource harvest.

Yet, despite the conflicting views, there have been few attempts to establish or estimate the present or potential contribution of natural resources to the northern economy (Berger 1977; Lu 1972). Attempts of this nature are a recent development. Palmer (1974), referring to the need for measures of the net value of hunted produce in the North, strongly recommended that action be taken to overcome this missing link in our northern economy. "Without these, it is impossible to comprehensively evaluate the economic impact of northern development on the traditional sector" (Palmer 1974:VVIII).

Kuo (1972) expressed concern about comparing the economies of the North and South, especially with the omission of imputed values for country food. Berger (1977) expressed similar views and wondered how imputed values could be omitted when they are of greater significance to the economy in the North than that in the South. The lack of imputed values stems more from poor measuring techniques than from oversight. Attempts to find a means to properly determine these imputed values have often led to the use of generalizations (Usher 1971a; Lu 1972; Bissett 1973; and Gourdeau 1974). Palmer (1973) stated that the problem of finding a standard means of measurement was a result of the traditional sector and market sector being two different systems and that no "correct" price for country production was possible. Berger's 1977 inquiry into the Mackenzie Valley Pipeline development produced similar conclusions, stating that market value was often much lower than the welfare value for country food.

The importance and value placed upon traditional harvesting, and the awareness that the northern natives have of the situation, were summed up by Van Stone (1974:114) when he said "it is significant, however, that despite their removal from their traditional manner of exploiting the environment in which they live, the Indians' attachment to their homeland is the strong basis on which all their programs and hopes for the future rests". Presentations to the Berger Inquiry (1977) concluded that native people consider renewable resources, particularly furs, fish, game, and timber, to be essential to their identity and their way of life. These resources must be the cornerstone of native economic development, and neither the initiatives nor the benefits should be appropriated by others.

In the context of the above discussion it is, therefore, appropriate that this study proposes to examine the current economic situation and to determine the significance of the native subsistence economy, albeit in only one location in the North. Long periods of industrial contact and exposure to government health, education and employment programs are not expected to reduce the local significance of subsistence economies. The most important factor is not the imputed value of subsistence production but rather that its significance be recognized and established. Assigning market values for subsistence produce is a means of accomplishing this and can be useful in evaluating the economic impact of past and future northern development. To attach singular importance to the monetary value assigned would be erroneous, however, because it is subject to change caused by market fluctuations and does not include cultural considerations.

1.3 Hypotheses

1.3.1

In view of the other studies completed on the economic and cultural importance of natural resource harvest in the economy of the northern native community (Kuo 1972; Lu 1972; Bissett 1973; Palmer 1973; Gourdeau 1974; Krech 1974; Palmer 1974; Asch 1976b; Rushforth 1976; Berger 1977), it was hypothesized that the natural resources harvested from the Slave River Delta area for food and clothing, will constitute an important contribution to the well-being and welfare of the native peoples of Fort Resolution who attempt to harvest the resources from the land.

1.3.2

The actual harvest of these natural resources is expected to be concentrated into periods of local resource abundance (Helm 1961; Van Stone 1963; Usher 1965; Klein 1966; MacAulay 1968; Barry 1973; Van Stone

1974; Sharp 1975; Rushforth 1976). Harvest levels will be strongly influenced by the accessibility of the resources and will tend to be most significant in the spring and fall. Economic conditions are expected to be of secondary consideration.

1.3.3

The heavy harvesting pressure on the resource base of the delta in the spring and fall or during periodic resource abundance, will affect the status of the more sedentary resident wildlife populations. In view of previous studies of native peoples harvesting in a reduced or confined harvest area (Law 1950; Van Stone 1963; Sharpe 1975; Smith 1975; Walton-Rankin 1977), it was hypothesized that the resource base of the Slave Delta is overharvested, especially in times of low levels of wildlife population, and that this will lead to the deterioration of the resource.

1.4 Objectives

1.4.1

To record the actual harvest of resources from the delta, observations being made on the difference between harvested levels and those resources actually removed from the harvestable base. (Harvest levels may not take into account losses due to poor trapping techniques, wounded animals escaping or fish left to rot in the nets.)

1.4.2

To record observations made on harvest techniques in use in the delta (noting any seasonal variation in technique or resource), and to map existing and past traplines and means of access within the delta.

1.4.3

To document the utilization of the resource harvested, and to record the means of preservation, preparation, and consumption. Wastage levels will also be recorded.

1.4.4

To assign economic or market value to the harvested resources (both those sold and used in kind) and to determine incomes generated by traditional hunting and gathering activities. The estimated incomes will be assigned to household units and remarks will be made as to their importance to the local economy. This importance will be determined by comparing incomes generated with the total income of the household.

1.4.5

To examine the attractiveness of wage employment to native people already employed, unemployed or soon-to-be employed. The comparison of the attractions of the wage sector with those of the traditional lifestyles of hunting, trapping, fishing, and processing of collected resources should allow some observations to be made regarding the future of traditional activities.

STUDY AREA

2.1 Introduction

"Of all the places I have ever been in my life, I still remember the delta of the Slave . . . as the loneliest. Here is loneliness on a scale awe-inspiring, and increased by your knowledge of having seen no habitation for so long. Broad and flat, the marsh grass extends for miles, and there were more wild geese and duck than I had ever believed possible in a single place. We came out of the channel to the edge of the lake which stretches far away into the twilight looking cold and hostile, and in a strong wind it was kicking up a fast, ugly chop. The name they give to this place is Res Delta, after Fort Resolution just around the bend of the lake from the river's mouth. There are no ships on the lake, nothing here at all, apparently, but the geese, ducks, and pelicans, and the muskrats printing v-trails in the water as they swam away from the barges. I had the feeling that I was approaching nothing at all" (MacLennan 1974:195).

2.2 Regional Location

The Slave River Delta is an arcuate shaped area located at 113°30'W and 61°15'N. The delta which covers approximately 290 km.^{2} , is located 13 km. north-east of Fort Resolution on the south shore of Great Slave Lake (Figure 2.1). The southwest corner of the delta, Nagle Bay, is only 2.4 km. from the community (Figure 2.2). The boundaries of the delta have been defined using geomorphological and biogeographical criteria where possible. English (1979) has defined the delta for the

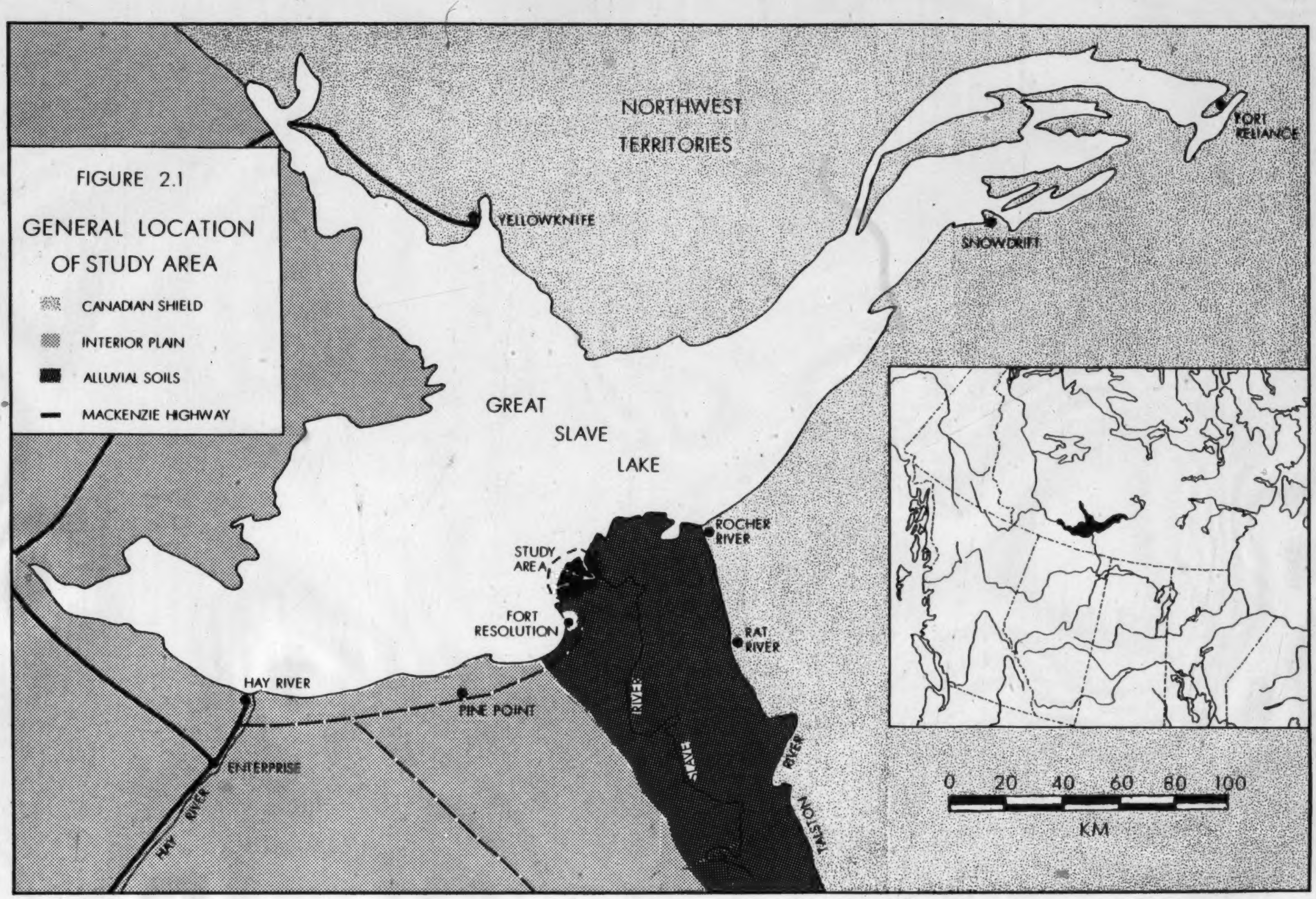

FIGURE 2.1

GENERAL LOCATION OF STUDY AREA

CANADIAN SHIELD
INTERIOR PLAIN
ALLUVIAL SOILS
MACKENZIE HIGHWAY
NORTHWEST TERRITORIES
YELLOWKNIFE
SNOWDRIFT
FORT RELIANCE
GREAT SLAVE LAKE
STUDY AREA
ROCHER RIVER
FORT RESOLUTION
RAT RIVER
HAY RIVER
PINE POINT
ENTERPRISE
HAY RIVER
SLAVE RIVER
TALSTON RIVER
0 20 40 60 80 100
KM

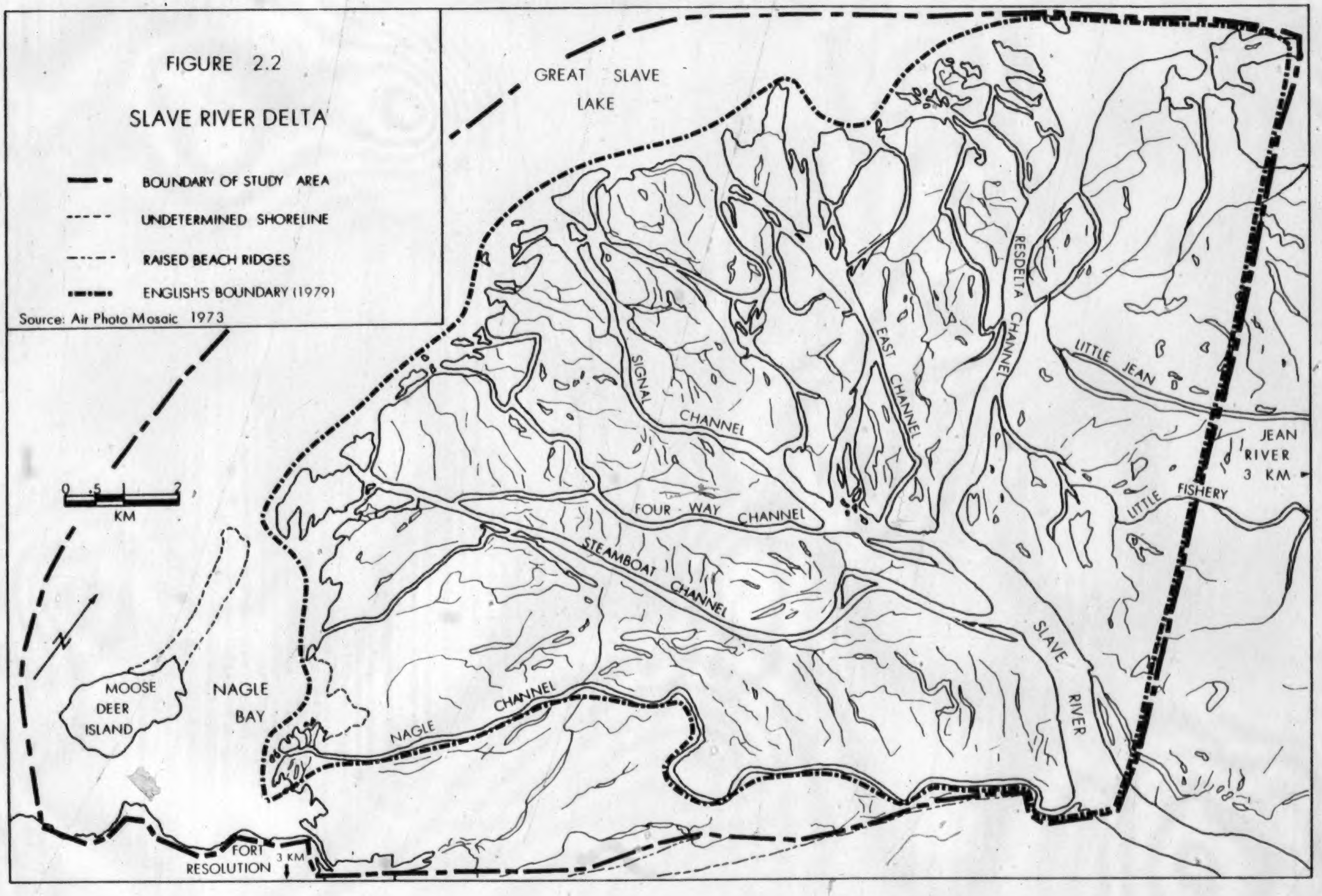

FIGURE 2.2

SLAVE RIVER DELTA

BOUNDARY OF STUDY AREA
UNDETERMINED SHORELINE
RAISED BEACH RIDGES
ENGLISH'S BOUNDARY (1979)
GREAT SLAVE LAKE
SIGNAL CHANNEL
EAST CHANNEL
RESDELTA CHANNEL
LITTLE JEAN
JEAN RIVER 3 KM
LITTLE FISHERY
FOUR WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
MOOSE DEER ISLAND
NAGLE BAY
FORT RESOLUTION
3 KM
0 .5 1 2
KM
N

Source: Air Photo Mosaic 1973

purposes of his biophysical thesis, as having a northeastern border extending from the apex of the delta, at 61°15'N, 113°30'W, to the islands in Jackfish Bay at 61°21'N and 113°33'W. Nagle Channel was used by English to delimit the southern edge of the delta and the shoreline of Great Slave Lake acted as the northwest boundary. For the purposes of this study the southern boundary of the active delta was established through map analysis and field observations. The southern edge of flooded or frequently flooded land has been expanded from that described by English (1979) to include the area between Nagle Channel and the raised beach ridges. The delineation of the active delta is difficult because the delta extends northeast to Jean River.[2] Consequently the northeast boundary is arbitrary, which is in accordance with the definition supplied by English (1979). However, unlike English's (1979) definition the northwest boundary of the study area extends beyond the shoreline of Great Slave Lake to include Moose Deer Island. It is necessary to encompass this larger area in order to include the fishing activities that take place in it. It should be noted that in the study, boundaries are not strictly adhered to but are used as guidelines because of the movement of the wildlife resources in the study area.

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[2] Jean River branches off the main channel of the Slave River twenty-five kilometers by river south of Great Slave Lake. The river is comparable to Steamboat Channel in size and range of flows and discharges into Great Slave Lake five kilometers northeast of the mouth of ResDelta Channel.

2.3 Drainage

The Slave River Delta is part of the physiographic subdivision known as the Interior Plains Province (Day 1972). The dissected topography of the delta is a sharp contrast to the rugged, rolling Canadian Shield region to the east (Figure 2.1). The relief of the study area is low, having a maximum elevation of less than ten meters above the base level of Great Slave Lake: the topography extremely flat, so that variation in water level has the potential to inundate large areas. Fifty-one percent of the delta is submergent, either at or below the low summer water levels of Great Slave Lake (English 1979).

The delta differs from the other major deltas in the Mackenzie River drainage system, such as the Peace-Athabasca and Mackenzie in that meander scroll depressions, interlevee basins and perched lakes are rare. The areas of still water are made up principally of abandoned distributaries created by the shifting of the major channels during flood stage.

The peak period of flow in the Slave River occurs soon after spring break-up with the minimum discharge in winter. Some of the Slave River's flow is diverted to the northeast through Jean River and only an arbitrary distinction between the two discharges and associated features is possible (Figure 2.2). The main channels of the delta are Nagle, Steamboat, East, Signal and ResDelta. Approximately twenty years ago according to local informants, the main volume of flow shifted to the ResDelta Channel from the East Channel.

Annual discharges over the past 17 years have varied from a minimum of 2540 m^3/s in 1970 to a high of 4560 m^3/s in 1973 and have averaged 3550 m^3/s (Water Survey of Canada 1977).

Flood stages in the delta are lower than would be expected because Lake Athabasca acts as a regulatory device on the Slave River's main tributaries, the Peace, Athabasca and Fond du Lac rivers. In other words, Lake Athabasca acts as a natural sump for these rivers' discharges. Prior to the construction of the Bennett Dam on the Peace River at Portage Mountain, the level of the Peace in the three week period of spring flood was higher than that of Lake Athabasca. Flood waters of the Peace flowed down the gradient to Lake Athabasca, reversing the normal flow. Flood waters entered Lake Athabasca through Rivière des Rochers, Revillon Coupé and Chenal des Quatre Fourches (Geen 1974; Howell 1978). The large surface area of Lake Athabasca can accommodate the large inflow of water with an annual water level fluctuation of 1.7 m (Peace-Athabasca Delta Project 1972:14). The construction of the Portage Mountain Project (W.A.C. Bennett Dam) has regulated the flow of the Peace River, removing the large flood peak (Howell 1978).

2.4 Climate

Climatic conditions for the Slave River Delta area are recorded today at the meteorological station at Fort Resolution Airport. Although the location of meteorological data collection has varied during the past 30 years, the difference in the locations of meteorological stations has been minimal and should not affect the quality of the recorded data (Table 2.1).

The climate of the south shore of Great Slave Lake can be classified as Continental Subarctic (Dfc) according to the Köppen-Geiger classification (Strahler 1976). The winters are long, cold and severe, of approximately 8 months duration and the short, warm summers are frost-free for only some 100 days (Burns 1973). Great Slave Lake influences the climatic conditions, having an ameliorating effect. Summer and winter temperatures are not as severe, therefore, as those of inland locations.

Approximately half of the precipitation is rain and half is snow (Environment Canada 1977). The 30-year annual average is not sufficient to prevent a moisture deficit in most years. Rainfall occurs between May and September with the maximum in September. Most of the summer precipitation is from local convection. During this time period the region is influenced by cool, moist Pacific air and the maritime Polar air mass. Maximum precipitation occurs in November, with a 30-year mean of 4.37 cm., most of which is snow. Winter is dominated by the Mackenzie high pressure system of the Arctic air mass. Minimum precipitation occurs in March and April, 1.20 cm. being the 30-year mean.

Spring break-up also plays an important role in modifying the climate of the delta. River break-up usually occurs in mid-May but leads of open water appear in April. Great Slave Lake does not break-up until June. The resulting decrease in the surface albedo of the delta causes the study area to be warmer than surrounding areas during early summer (Hare and Ritchie 1972; Gill 1975; and Environment Canada 1977).

TABLE 2.1

CLIMATIC CONDITIONS (FORT RESOLUTION)

Mean Annual Mean Monthly Temperatures (Degrees Celsius)

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN
1974 (ACTUAL)	-22.2	-25.0	-21.7	-3.9	5.6	13.9	15.0	12.8	5.6	-2.2	-7.2	-17.8	-4.4
30 YEAR AVERAGE	-26.1	-23.8	-16.7	-5.6	5.0	11.7	15.6	14.4	7.8	0.6	-11.1	-21.1	-3.9

Monthly & Annual Total Precipitation (mm.) & Snowfall (cm.)

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN	SNOW
1974 (ACTUAL)	2.79	2.46	2.82	.20	1.78	4.67	9.06	3.70	4.59	3.15	3.20	3.73	41.73	246.66
30 YEAR AVERAGE	1.45	1.36	1.20	1.20	1.57	2.50	3.55	3.30	3.81	3.37	4.37	1.98	29.57	153.92

1974 Temperature Extremes, Monthly & Absolute Temperatures (Degrees Celsius)

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AB
MAXIMUM	-5.6	-2.2	-1.1	12.2	22.8	27.2	26.7	28.9	20.6	6.1	6.7	-0.6	33.3
MINIMUM	-51.1	-42.8	-40.5	-30.0	-15.0	-2.2	1.7	-2.2	-4.4	-13.3	-20.0	-33.4	-52.8

0° C FROST	mean date (last) spring	June 3
	(first) fall	Sept 14
	frost free period days	103
	degree days	1510
5.6° C GROWING SEASON	beginning	May 17
	end	Sept 24
	duration	130
	degree days	1657

Source: Environment Canada, Climate of Alberta, with data for Yukon and Northwest Territories, 1977.

Freeze-up of the delta occurs in late October coinciding with continuous snow cover.

2.5 Glaciation, Soils and Permafrost

The study area was glaciated by the Laurentide ice sheet. Moose Deer and Round islands, located at the outer edge of the delta, are roches moutonnées (Cameron 1922) and provide good evidence of the glaciation. During the early Halocene, the glacial ice retreated and a large ice marginal lake, Lake McConnell, was formed in the isostatic depression between Great Slave Lake and Lake Athabasca (Craig 1965). Evidence of the extent of this glacial lake can be found in stranded beach lines south of Nagle Channel and in lacustrine deposits (Radojicic 1967)(Figure 2.2).

The soils of the delta are formed from post glacial alluvial deposits, distinguishing them from archean granites and gneiss to the north and east and the paleozoic gypsum and breccia to the west (Day 1972). The Cumulic Regosols are composed of brownish grey calcareous loamy sand to silty clay loam. According to Day (1972) they are well to poorly drained. These soils are associated with areas inundated during spring flooding. Areas of the delta rarely flooded have developed Orthic Humic Gleysols.

The study area is within the discontinuous permafrost zone defined by Brown (1960, 1974). Day (1972) found permafrost to be associated with the white spruce assemblages of the delta. The distribution of permafrost is more extensive than previously expected though, because it can be found in sedge tussock communities (Gill 1976; English 1979).

2.6 Vegetation

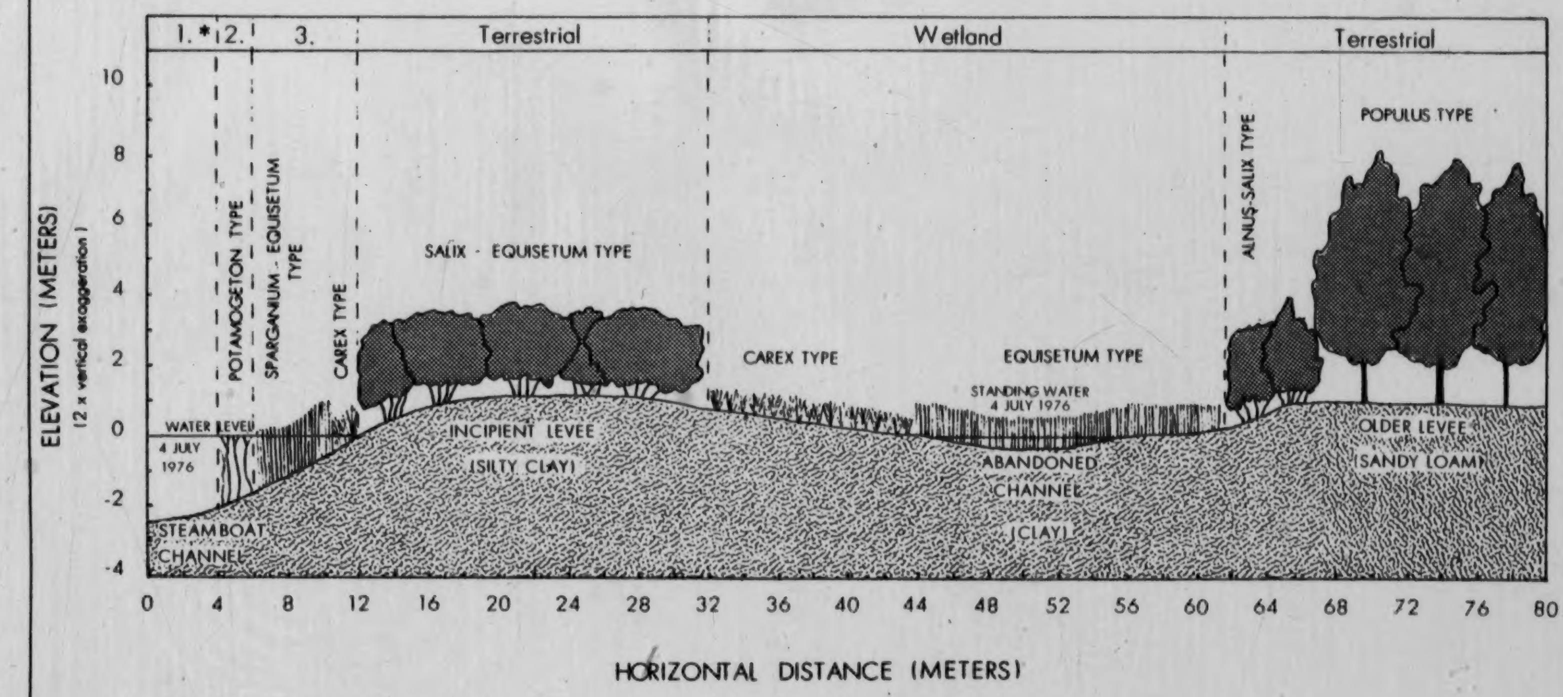
The forest of the Slave River Lowlands and Fort Resolution area is classified as Forest Region B.23a, Upper Mackenzie Boreal Forest (Rowe 1972). The Slave River Delta and Lowlands are distinguished from the surrounding area by the dominant coniferous species, namely white spruce (*Picea glauca*), which is restricted to the well drained, higher, seldom flooded alluvial soils. Rowe (1972) and Day (1972) identified large areas of white spruce and balsam poplar (*Populus balsumifera*) on the river's alluvial flats. Areas around the Slave River are characterized by black spruce (*Picea marina*) and jackpine (*Pinus banksiana*) (Raup 1946; Harper 1931).

The general successional profile developed by Gill (1976) demonstrated the effect of flood frequency on vegetation (Figure 2.3). Mineral soil deposition during the spring flood provides nutrient for a wealth of perennial herbs, grasses, and equisetum in the wetlands. In the better drained, less frequently flooded sites, colonization is a progression of *Salix spp.*, *Alnus spp.*, and *Populus balsumifera* (English 1979).

The composition of the outer delta plant community is different from that of the inner delta. The former has more aquatic and wetland species and it does not sustain any tree growth. The large mud flats of the outer delta are much more extensive than those located along the river channels.

FIGURE 2.3

VEGETATION ZONATION ALONG STEAMBOAT CHANNEL


1. *
2.
3.
Terrestrial
Wetland
Terrestrial
POTAMOGETON TYPE
SPARGANIUM - EQUISETUM TYPE
CAREX TYPE
SALIX - EQUISETUM TYPE
CAREX TYPE
EQUISETUM TYPE
STANDING WATER 4 JULY 1976
ALNUS-SALIX TYPE
POPULUS TYPE
WATER LEVEL 4 JULY 1976
STEAMBOAT CHANNEL
INCIPIENT LEVEE (SILTY CLAY)
ABANDONED CHANNEL (CLAY)
OLDER LEVEE (SANDY LOAM)
ELEVATION (METERS)
(2 x vertical exaggeration)
10
8
6
4
2
0
-2
-4
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
HORIZONTAL DISTANCE (METERS)

*1. Moving water 2. Aquatic 3. Wetland

Source: Gill 1976

2.7 Wildlife and Fish

2.7.1 Wildlife

Wildlife populations in the Fort Resolution area have been subject to variation in size throughout the history of the native settlement. This fluctuation in numbers has been a result of natural or man induced regulation (Radojicic 1967). The natives of Fort Resolution who now are mostly Chipewyan, were called "caribou eaters" by Hearne. The migration routes of the caribou were important to the hunters but since the western shift to more permanent settlement in Fort Resolution, they have become divorced from the more eastern migration routes of the Bathurst caribou herd, (*Rangifer tarandus groenlandicus*).

The lack of this regular meat supply, (the herd has passed through the study area only three times in living memory) has resulted in a concentration on non-migratory food resources with the exception of ptarmigan and waterfowl. The eutrophic alluvial habitat of the delta is ideal for the growth of abundant aquatic vegetation and succession willow growth and these are some of the main reasons for the presence of the large herbivore, (*Alces alces*) the moose. The animal's numbers have fluctuated historically and now appear to be increasing (G.N.W.T. 1976b; Novakowski 1967). Local populations also exhibit a seasonal fluctuation, with the largest numbers found in the spring and summer when the islands of the delta offer the young animals safety from predation.

Black bear (*Ursus americanus*) are common throughout the delta. Aquatic fur bearers represent, however, the largest population in the delta, with the muskrat (*Ondatra zibethicus*) being extremely abundant during peak years. The multitude of sloughs and waterways provide ideal habitat for shelter and food. Beaver (Castor canadensis) are relatively abundant in the main waterways. The dense growth supported by the rich soil and abundant moisture create a high small mammal and avian predator density.

2.7.2 Waterfowl

The Slave Delta is a prime staging and resting area for two major waterfowl migration routes (Bellrose 1976). The early open water and exposed food supply (Equisetum spp.) attract large numbers of ducks, geese, swans, and sandhill cranes (Soper 1957). The number of birds in the fall migration is larger than the spring migration and they feed on the extensive beds of potamogeton growing in the outer delta. The alluvial habitat also supports a large population of resident nesting fowl, although the number is substantially smaller than the transient population (Soper 1957).

2.7.3 Fish

The muddy, turbid waters of the Slave River Delta support a large number of fish species because of the nutrients carried out into the colder waters of Great Slave Lake by the plume of the Slave River (Rawson 1950). The whitefish (Coregonus clupeaformis) are the most abundant fish in the delta area, especially in mid-September when spawning (McPhail and Lindsey 1975). It was noted that Lake Cisco (Coregonus spp.) are confused with whitefish by the local residents. Large numbers of burbot (Lota lota) can be caught in the back eddies and channels of the delta in November and December. Inconnu (Stenodus *leucidhthys mackenzi*), the largest fish found in the study area, follow a similar spawning timetable as the whitefish. Jackfish (*Esox lucius*) are abundant during their spawn after spring break-up. Large numbers of longnose suckers (*Catostomus catostomus*) can be found in the outer delta. The calmer, quieter backwaters are home to the goldeye (*Hiodon alesoides*) and walleye pickerel (*Stizostedion vitreum*). Lake trout (*Salvelinus namaycush*) were formerly caught off the edge of the Slave River sediment plume but have been extremely rare for the last decade.

2.8 Deltaic Conditions Relating to Productivity

The Slave River Delta experiences periodic flooding. Break-up of the river and resulting open water early in the season lowers the local albedo and creates a warmer microclimate than the surrounding area. The seasonal influx of sediment-laden waters recharges the many abandoned distributary channels and inter-basin lakes within the delta with nutrients and helps restore water levels. Ice scouring during break-up discourages the development of riparian vegetation and the combination of water, warm temperatures and nutrient-rich soils promotes the heavy growth of littoral and aquatic vegetation.

The combination of warm temperatures, longer growing season, adequate water and periodic rejuvenation of soil nutrients supports a highly productive vegetation community. This community provides shelter and food for a large number of fish, aquatic and terrestial mammals and avifauna. The richness of the habitat allows for greater species diversity and densities than that found in the surrounding boreal forest.

2.9 Historical Sketch of Fort Resolution

The Slave River Delta held an important geographical position in the fur trade. Located on the south shore of Great Slave Lake and connected to the main base post of Fort Chipewyan, all trade goods destined for the trade posts on Great Slave Lake or the Mackenzie Valley had to pass through the delta. The furs and food stuffs received for the trade goods were handled by water transport and consequently had to pass through the delta to reach Fort Chipewyan (Mathewson 1974).

In 1786 Cuthbert Grant of the Northwest Company and his rival, Laurent Laroux, of the McLeod and Company, established posts or "houses" in the Slave River Delta, making them the earliest settlements in the Northwest Territories. Shortly after this date their posts were re-established farther to the east (Fidler 1934). The Hudson's Bay Company built "Chiswick House" in the delta in 1803 but was forced out of business by competition from the Northwest Company post at Stony Point, to the northeast of the delta. The post was re-established on Moose Deer Island in 1815 and was renamed Fort Resolution in 1819.[3] The merger of the Northwast Company and the Hudson's Bay Company in 1821 allowed the Hudson's Bay Company to relocate to its present site in Fort Resolution (Smith 1976:105) (Figure 2.4). Visible evidence of former structures or their locations have been obliterated by age or shifting river channels.

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[3] Two islands very close to each other have been referred to as Moose Deer Island in the literature. The Moose Deer Island mentioned by Fidler is, in actuality, Mission Island, not the Moose Deer Island in Figure 2.2. Mission Island was separated from the mainland by Mission Channel but heavy driftwood accumulation in the channel as well as low water levels have all but dried up the channel. Mission Island is actually part of the mainland for most of the year. The bottom left corner of Figure 2.2 represents the present-day Mission Island.

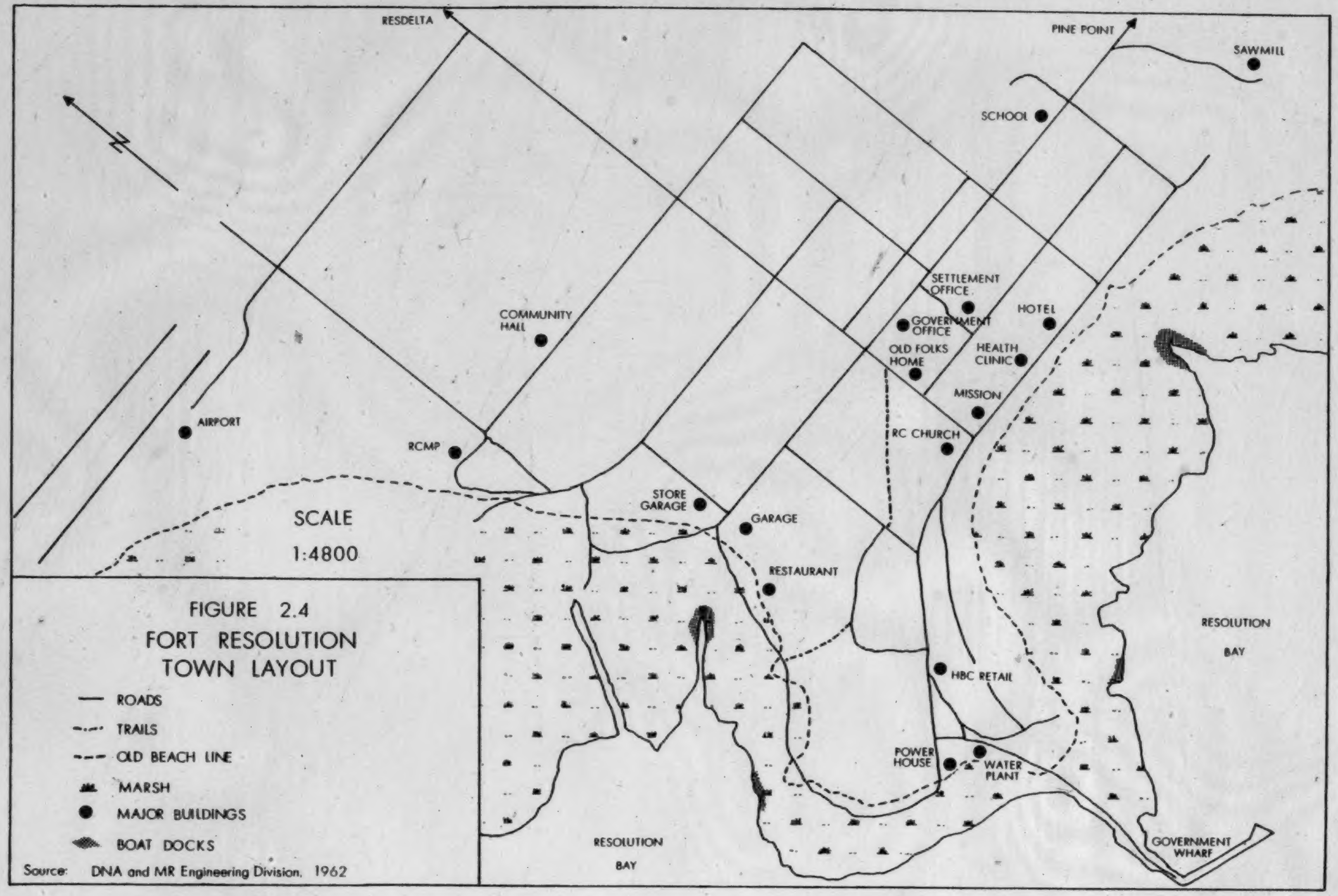

FIGURE 2.4
FORT RESOLUTION
TOWN LAYOUT

SCALE
1:4800
ROADS
TRAILS
OLD BEACH LINE
MARSH
MAJOR BUILDINGS
BOAT DOCKS
RESDELTA
PINE POINT
SAWMILL
SCHOOL
SETTLEMENT OFFICE
GOVERNMENT OFFICE
HOTEL
OLD FOLKS HOME
HEALTH CLINIC
MISSION
COMMUNITY HALL
AIRPORT
RCMP
RC CHURCH
STORE GARAGE
GARAGE
RESTAURANT
HBC RETAIL
POWER HOUSE
WATER PLANT
RESOLUTION BAY
RESOLUTION BAY
GOVERNMENT WHARF

Source: DNA and MR Engineering Division, 1962

The Roman Catholic mission, established by Father Faraud (Oblats de Marie Imaculée) in 1852, was built on Mission Island but later moved closer to the trading post and has been a factor in the community life ever since. During the period, 1821-1852, the Fort Resolution post was the only one trading on Great Slave Lake, and the Hudson's Bay Company held a monopoly until 1890 (Usher 1971b). Despite the monopolistic advantage held by the trading post, it did not gain a reputation for producing large volumes of fur (Smith 1976). The strategic position of the settlement can be demonstrated by the large number of competing posts which established themselves after 1894. At one point in 1902, the community boasted six traders, and maintained the leading position until the decline of the fur trade (Usher 1971b).

The settlement developed as a transportation and commercial center. But with the reduction in fur trade, and subsequent failure of most of the rival traders, along with the development of road (1948), air (1955) and rail (1964) linkages from the south to Hay River, west of Fort Resolution, the economic and transportation importance of the community declined.

The people of Fort Resolution are of the Athapascan language family and the Desnedekande dialect group of the Chipewyan language. For the purpose of this study they will be referred to as Chipewyan.[4] Historically, they were in conflict with other Athapascan subgroups (Slaves, Beaver, Yellowknife and Dogrib), which when combined with the attractions of the fur trade, encouraged them to shift their territory from the east arm of Great Slave Lake to an area concentrated around the delta. Smith (1976) has done extensive work on the contraction of their trade and subsistence areas resulting from the trading posts at Fort Resolution.

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[4] Treaty Number 8, signed by the Chipewyan of the south shore of Great Slave Lake on 25 July 1900, recognized that their traditional hunting grounds lay within the treaty limits. Annuity was established by the treaty but no reserves or lands were taken by the Indians (Canada, Indian Affairs. 1900).

2.10 Fort Resolution

Unlike other settlements along the south shore of Great Slave Lake, Fort Resolution does not appear to have any one ethnic group dominating the social structure of the community (Slobodin 1966). The present demographic breakdown shows that there are 264 Metis (mixed blood), 187 Treaty Indians (Treaty 8, Band 14), and 46 whites (Table 2.2). The white population is transient in nature and usually includes school teachers, government workers, and RCMP personnel. The Metis population has been increasing steadily until recently and the Treaty Indians have fluctuated in numbers but have consistently declined. The total population of Fort Resolution is now at the lowest level it has been for over a century. In addition to the human inhabitants, the settlement also has in excess of 440 dogs scattered among the houses.

2.10.1 Physical Layout of Townsite

The townsite of Fort Resolution forms a double cresent centered on the government wharf and around the shores of Resolution Bay (Figure 2.4) (Plate 2.1). The point leading to and including Round Island shelters Resolution Bay from the prevailing winds and rough water of Great Slave Lake, creating a relatively quiet harbour. An early

TABLE 2.2

FORT RESOLUTION POPULATION COMPOSITION

YEAR	1910	1920	1930	1940	1950	1971	1976
WHITES	44	65	85	83	67	65	47
METIS*	82	111	219	277	254	331	264
TREATY INDIANS*	580	624	439	305	338	210	187
TOTAL	706	800	743	665	659	606	498

Sources: Government of Northwest Territories, Population Survey of Fort Resolution, 1977.

Slobodin, R., Metis of the Mackenzie District, Canadian Research Centre for Anthropology, 355 p., 1966.

Smith, D.M., Fort Resolution People: an Historical Study of Ecological Change, Ph.D. Dissertation, Univ. Minnesota, 1975.

*Treaty Indians still maintain the treaty rights such as collecting annuity as established in either Treaty 8 or 11. Metis are those Indians who have lost their treaty rights, through intermarriage with individuals other than Treaty Indians. In mixed marriages, if the father has treaty status, the children are considered Treaty Indians, but if the mother has treaty status and the father does not, the children are considered Metis. The steady decline in Treaty Indians in Fort Resolution can be attributed to intermarriages and the outbreak of influenza around Great Slave Lake during the late 1920's and early 1930's.

2.1 Aerial view of the north end of Fort Resolution looking west. Older structures are situated along the shoreline.

settlement pattern is reflected in the older structures situated around the shore and is an extension of the tenting patterns exhibited in earlier trading days. The town outline has developed in a grid system based on a federal survey inland from the lake shoreline, although the street pattern has been modified to accommodate shortcuts and footpaths (Slobodin 1966). Most of the structures are situated on a large flat plain approximately three to five meters above the marshy shoreline. Three old buildings are situated below the crest of the steep incline to the developed area. The main concentration of wooden frame and log buildings extends northwest from the Hudson's Bay Company complex. The town roads are of gravel construction and the main highway connects the town with Pine Point 65 km. to the west, the federal airport one km. to the north and the Slave Delta eleven km. to the east. Highway construction was completed in 1970 (Deprez 1971).

The townsite also contains the following facilities; a water treatment plant, elementary school, firehall, settlement office, laundry, old folk's home, health clinic and the diesel-electric generation plant run by the Northern Canada Power Commission. In addition to the above amenities, there is government housing for both government personnel and native peoples. As of 1971, a small minority of the houses (less than 10%) had running water and indoor toilets (Grainge 1971). The situation has changed little since 1971 with only the government buildings having running water or septic sewage systems. The town's drinking water supply is produced at the water treatment plant near the lake and trucked to individual houses daily.

METHODS

3.1 Introduction

Numerous field techniques have been developed and used in the social sciences to collect information on social behaviour. However, the methods used in the social sciences have often been critized by the more quantitative sciences as being unreliable and lacking in validity, in short, inadequate for testing theories and hypotheses. Although the techniques have inherent faults, once the potential sources of error are identified, and measures taken to increase the validity and reliability of the results, they can and have, often proved to be the most effective research techniques available to the behavioural scientist.

This resource utilization study will use three different information collection methodologies; observation, interviewing and document search. These are the most appropriate to the information to be collected and the potential problems of the field area. Appendix I identifies the disadvantages and advantages of each technique. Included in the discussion are the techniques involved in reducing the possibility of errors or biases being created by these research methods. By employing all three methods throughout the field season, it was hoped that the disadvantages of each system could be minimized by using the advantages of alternative methods. Government restrictions for ethical research and local field restrictions had a pronounced effect on the application of suitable research techniques and the eventual results. The influence of government guidelines and local conditions will be discussed in context with the techniques employed in the field.

Once the necessary information had been collected by the selected techniques, totals were prepared for the community as a whole and economic values imputed based on the substitution costs at the local level.

3.2 Government Regulation

Recent discussion papers developed by the Government of the Northwest Territories and the Science Council of Canada have addressed the problem of community research in the North (Roberts-Pichette 1977). The suggested guidelines for social research require that social scientists obtain permission for access from community leaders prior to initiating research. When applying for community access, the scientist should also inform the residents of the project's objectives and the problem being examined. The Science Advisory Board of the Northwest Territories requires that confirmation of community acceptance accompany any requests for the scientific licenses that they issue. If at any time the study can potentially harm the residents or become a form of harassment, it should be aborted. Canadian universities and funding agencies have endorsed these guidelines by making similar requirements a part of their funding regulations (Roberts-Pichette 1977).

3.3 Local Conditions

3.3.1 Research Ethics

Research groups studying social behaviour in native communities in the North have not always gained or earned good reputations. Research has often been undertaken by withholding information such as purpose of the research or the researcher's identity from the group being studied. This misrepresentation has, at times, its scientific merit but it has also created a mood of mistrust and suspicion among native people. Anyone who is interested in them is believed to have ulterior motives, such as economic gain at their expense. The distrust and suspicion built up over the years of dealing with successions of fur traders, not all of whom were honest or honourable, has raised behavioural barriers towards 'outsiders'. By withholding the observer's identity or the interviewer's research purpose, what happens when the population detects that it is not being treated with respect? The validity of the results obtained after that period is questionable. As a result of past deception, the population has become sensitized to the researcher before the start of the research project merely because he or she is a stranger. Information offered by the population is usually only that which is socially acceptable, with valuable information being withheld, often without the researcher having any indication of the deception. Government policy decisions based on these erroneous research results can be injurious to the population, in turn creating greater cohesion within the population and resistance towards outside interest in its lifestyle.

Native residents are tired of being studied by scientists every summer, often without receiving any feedback or information once the research period is over. As a result of past deception and the lack of any perceived benefits from the research, the residents have become unreceptive toward research proposals and have all but closed their communities to 'outsiders'.

3.4 Observation Techniques

Both direct and indirect observations were used in this study, although the majority were direct (Appendix I). Physical trace elements were useful in determining the wildlife resource composition and to locate areas of human occupancy. Photographic records were also kept of the evidence of past and present land use.

Permission to engage in research was obtained after the research problem, objectives and purpose were explained to the Fort Resolution Settlement Council in May 1977. Although permission had been obtained, the stigma associated with being a stranger in the community made observation the only suitable research technique in the early stages of the research. Information was originally recorded as a detached observer and as community acceptance was achieved, more information was collected by active participation in harvesting activities. The use of multiple observers or misrepresentation of the observer role to reduce biases could not be used in this study because of the limited funding and understandably, suspicion on the part of the residents due to past misrepresentation. The writer, in any case, refuses to accept the use of hidden observer identity as it is an unethical survey technique even though it is validated in the literature (Appendix I).

Observations were structured and recorded under appropiate harvest activities to allow for future repetition of the process and the possible comparison of results over time or throughout the study area.

3.5 Interviews

In order to gain natural resource harvest information not adequately represented in published or continuous government or private sources[5], it was necessary to interview the male inhabitants of each native household in the community of Fort Resolution. The focus of the interviews was to determine the quantity of natural resources harvested for the years 1975-76 (July-June) and 1976-77 (July-June). The interview questionnaire was designed to provide detailed information on subsistence harvest levels by species, resource areas, equipment used and utilization levels (see Appendix II).

The Fort Resolution Settlement Council was approached in March 1976 to obtain permission to conduct the outlined research project. At a meeting of the Council in early May 1976, the purpose and objectives of the project were explained and permission to proceed was obtained. Monthly council meetings were attended throughout the following summer and winter to describe progress and to keep the community informed.

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[5] Hudsons Bay Company and independent fur trader's records

A complete census of all the native households in Fort Resolution was attempted to determine the quantity of country food harvested and utilized from the Slave River Delta. Each household unit consisted of all the inhabitants occupying a single residence. This included occupants outside the nuclear family who lived at the residence during the study period. Male occupants between 14 and 70 years were interviewed to determine the quantity of country food harvested by the total household unit.

Of the 103 native households units identified for Fort Resolution, 102 provided information during personal interviews over the summer of 1976 and winter of 1976-1977. Individual households had to be interviewed because the existing information sources were inadequate. This was a result of the inherent faults of the General Hunting License returns and fur export records and the more site specific information needed for the restricted area of the Slave River Delta. [4]

Prior to initiating the more structured interviews designed to collect information on natural resource harvests, a number of casual interviews were completed. The prime purpose of these interviews was to develop rapport with the natives of Fort Resolution. Conversations were held in the field while the informants were engaged in activities under observation or in the settlement at the leisure of the respondents.

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[4] General Hunting License holders are not required to fill out a complete record of each year's harvest prior to renewing the license for the coming year. Failures to obtain a license or to adequately complete their records results in large data gaps. Also a large number of species are not recorded on the provided forms, especially the smaller game birds and animals such as ptarmigan, grouse and snowshoe hares. Fur export returns do not record the furs that have been used for personal clothing or in handicrafts made locally.

Casual conversations were useful for pre-testing the semi-structured interview process and for modifying the process prior to the more formal interviews. The local names of the resources of the area were identified for later use in the questionnaire.

Each individual interview of a household was preceded by a brief introduction to outline the objectives of the study and to ensure the understanding that material collected would be used only for the stated purpose of the study. The confidential nature of the information provided by each individual was also guaranteed. Interviews were conducted in the respondent's own home or in a setting suitable to the respondent.

The respondents were asked to identify the members of the household along with their age and sex. This was necessary to avoid double counting of country food production of individuals who had occupied more than one household during the study period. All information provided was recorded by the interviewer.

The quantity of natural resources was requested on a species by species basis. The information for species harvested in 1976-77 was sought first and then repeated for 1975-76, so that informants had a means of comparing yearly results and to aid their recall. Species requested in the questionnaire represent the species mentioned in the available literature sources and cover all those listed in the General Hunting License returns. This allowed the interview results to be compared to existing game harvest records. Common or local names were used where possible to avoid confusion. Characteristics such as age, sex and body length were requested to help estimate the live weights of the larger game animals such as moose and bear.

The methods used to harvest natural resources were recorded for each subsistence activity. Variations for specific species were also recorded. This was particularly important when dealing with trapping activities as different baits and sets were used for most species. The equipment used for subsistence activities was identified and recorded along with the age and condition of each article.

A large airphoto mosaic of the Slave River Delta was displayed when the locations of harvest activities were discussed. The informants were asked to study the map and identify areas used for each activity as well as their travel routes. Traplines and trails were identified along with the locations of their camps within the study area. Informants were also asked to identify other known camps occupied previous to the study period or occupied by other hunters, trappers and fishermen.

Information was requested on the percentages of the harvested country food that was used for human or animal consumption on a species by species and yearly basis. The remaining resources used for trapping baits were included under animal use, while the remainder was considered as wastage.

Additional comments on subsistence activities were obtained during the last portion of the interview when conversation was encouraged. Note taking during the interviews was restricted to recording statistical data and household members. Excessive note taking was avoided to facilitate a more relaxed interview atmosphere. Notes were written up after the interview was finished.

3.6 Imputed Values

Once the information on the level of production of natural resources harvested from the Slave River Delta was aggregated on a yearly basis for Fort Resolution, it was necessary to convert production to a cash value in order that the value of country food could be compared to the other sources of community income. Attempts to include subsistence production of country food into the market system are a recent development (Palmer 1974). Lu (1972) identified three methods of evaluating country food production which have been used by previous researchers: market values, opportunity costs and substitution. All three methods suffer from serious data defiencies which make the estimated cash values for country food questionable. Both Kuo (1972) and Usher (1976a) suggest substitution as the only appropriate methodolgy which imputes values to subsistence production.

Substitution values are based on the replacement costs of imported southern food stuffs available locally for country food. This method is questioned on the grounds that the food value of substitutes are inferior in protein equivalents. Nutrient differences are ignored along with the intangibles of culture and taste (Sara 1973; Berger 1977; and Schaffer 1977) (Table 3.1).

Market values are not a satisfactory means for imputing values because only furs are ever traded in the market system. In addition, opportunity costs are difficult to assess or assign to employment in the

TABLE 3.1

COMPOSITION OF FOOD (100 GRAMS EDIBLE PORTION)

(Country Food and Available Store Substitutes)

	Food	Water	Food Energy	Protein	Fat	Carbohydrate Total	Fiber	Calcium	Phosphorus	Iron	Sodium	Potasium
#	Description	%	Calories	Grams	Grams	Grams	Grams	MG	MG	MG	MG	MG
1.	Beef (Stand. Grade)	60.1	266	18	21	0	0	10	166	2.7	20	21
2.	Chuck (raw)	56.3	303	17.5	25.3	0	0	10	162	2.6	20	21
3.	Stand. Ground (raw)	60.2	268	17.9	21.2	0	0	10	156	2.7	--	236
4.	Heart (raw)	63.0	253	15.4	20.7	.1	0	--	182	--	--	--
5.	Tongue (raw)	62.0	271	14.4	23.0	.4	0	--	--	--	--	--
6.	Weiners (raw)	56.2	304	12.1	27.5	1.1	0	7	128	1.8	1300	230
7.	Garlic Sausage	53.7	304	15.7	25.8	1.2	0	9	176	2.4	--	--
8.	Pork Chops (raw)	54.8	323	16.4	28.0	0	0	9	185	2.5	122	123
9.	Spare Ribs (raw)	51.8	361	14.5	33.2	0	0	8	160	2.2	122	123
10.	Chicken Roaster	63.0	239	18.2	17.9	0	0	10	176	1.6	--	--
11.	Fryers	75.7	124	18.6	4.9	0	0	12	201	1.9	--	--
12.	Fish Sticks	65.8	176	16.6	8.9	6.5	0	11	167	.4	--	--
13.	Moose	72.4	123	25.1	2.5	0	0	10	219	2.7	--	--
14.	Beaver (raw)	46.2	408	14.3	3.9	0	0	15	262	5.9	--	--
15.	Muskrat (raw)	73.4	101	22.4	1.3	0	0	25	220	7.6	--	--
16.	Rabbit (raw)	73.0	135	21.0	5.0	0	0	12	226	3.2	--	--
17.	Bear	71.2	148	18.6	8.2	0	0	3	139	6.1		
18.	Ptarmigan	58.0	279	25.7	1.4	0	0	351	--	--	--	--
19.	Goose	51.1	354	16.4	31.5	0	0	10	176	1.6	--	--
20.	Duck (raw)	61.1	233	21.1	15.8	0	0	--	--	--	--	--
21.	Whitefish (raw)	71.7	155	18.9	8.2	0	0	--	270	.4	52	299
22.	Burbot (raw)	81.1	82	17.4	.9	0	0	--	190	--	--	--
23.	Northern Pike (raw)	80.0	88	18.3	1.1	0	0	--	--	--	--	--
24.	Inconnu (raw)	72.0	146	19.9	6.8	0	0	--	--	--	--	--
25.	Sucker (raw)	76.4	104	20.6	1.3	0	0	--	220	--	56	336

1. Source: Watt, B.K. and A.L. Merrill, Composition of Foods, Agriculture Handbook #8, Page 5-67, 1963.
2. Source: Unpublished manuscript by Christine Heller, Nutritionist, Arctic Health Research Center, U.S. Department HEW, Anchorage, Alaska.

traditional sector.

3.6.1 Substitution

No country food (fish or game meat) is sold in the retail outlets of Fort Resolution and little country food is sold or exchanged within the community. The small amount that is available is usually sold to relatives or friends. Quite often the exchange is made in return for favours or the loan of equipment rather than cash.

Since Fort Resolution does not have a consistent local market value for country food and previous subsistence studies have successfully used substitution, this study has used substitution to convert country food production to a cash value. The costs of comparable, locally available imported southern food stuffs were obtained from stocks on hand in the community's two retail outlets during June 1977.

3.7 Document Search

The continuous records used during this research included General Hunting License returns, Fur Tax Export records and Fur Trader's records. Other written sources of information on local conditions during the study period included the monthly Fish and Wildlife reports submitted to Yellowknife, and the minutes of the Hunter's and Trapper's Association of Fort Resolution and the Fort Resolution Settlement Council. The use of these documents was mainly as a check on the information collected from the observation and interview techniques.

However, in this study, because the General Hunting License returns and to a lesser extent the Fur Tax Export returns, tend to underestimate harvest levels, care has to be taken in their use as historical data. The suitability of these sources for the interpretation of harvest use and native attitudes toward their harvesting activities is minimal.

RESULTS

4.1 Introduction

Natural resources of the Slave River Delta provide a valuable source of income to the residents of Fort Resolution.

Production of goods from the biological resources of the Slave River Delta is derived from five activities within the local economy. These five activities can be divided into two main categories, subsistence production and commercial production. The traditional sector includes the activities of collecting, fishing, hunting, and trapping with little secondary processing of products. The non-traditional sector includes logging and lumber operations, processing of wood products from the delta. Some confusion may result from the use of these categories in that wood for fuel and shelter is collected traditionally but included under logging. The muskrat harvest is considered under the lone category of trapping despite the large number of animals shot or hunted during the open water periods.

Natural resources will be discussed in terms of the following: 1) the importance of the resource and the elements that are harvested to the local residents; 2) areas of activity based on actual observation or trace evidence of campsites; 3) the levels of production over the two year period; 4) the techniques used to harvest the resource and discussion of the factors determining successful harvest operations; 5) the preparations, preservation and use of the harvest resource and finally discussion of the significant factors and trends in the activities.

In the following discussion, the activities themselves are ranked on the basis of their relative importance to the local people from the least important to the most important. This traditional approach by cultural geographers was adopted because the most primitive activities are those which have been usually the more long lasting and the basis on which a more complex economy becomes established. Within each of the sections describing the activity, the products are discussed in order of decreasing importance in terms of quantity and usage. The importance of each product in terms of generated incomes is presented in Section 5.3. The specific equipment and technique used for each activity will be described for the most important species if duplicated for other activities. This is particularly important in terms of camp equipment which is used for all bush-related activities.

4.2 Gathering

4.2.1 Introduction

This type of traditional activity has not played an important part in the subsistence economy of the Chipewyan Indians. Of all the native groups sampled by Murdoch (1967), the Chipewyans were the sole group which did not rely on gathering activities to provide substantial country food resources. Despite the generalized nature of the study, the works of Van Stone (1963) and Smith (1976) have confirmed that the activity is of minor importance in terms of resource production.

The range of activities included in the broad category of gathering includes the collection of berries, raiding of eggs from the nests of waterfowl and other migratory birds, digging for roots and the picking of plant matter for medicinal and food purposes.

4.2.2 Data Problems

Areas utilized by the natives vary depending on the resource being harvested. Figure 4.1 shows the areas of the delta utilized for some of the products shown in Table 4.1 but they are not exclusive as additional areas are periodically used. In the case of berry production, the areas may potentially cover the whole study area depending on the particular variety harvested. There is, therefore, a underestimation of the number and location of specific berry harvest sites in Figure 4.1.

Production levels for the gathered resources are summarized in Table 4.1. The estimates of production shown have been obtained from the interviews conducted over the summer of 1977. It was necessary to rely on verbal testimony of the household members as no records were kept on this type of harvest. A small portion of the products collected in the previous harvest season would be unconsumed at the time of the interview but occasionally households had frozen samples that could be used to identify the products. Additional information was collected by observing the harvest activity in the months of July and August.

For the above reasons, the estimated quantities of gathered products are crude at best, so that this information has only limited reliability. No common means of collection was used by the informants and volumes and weights were used interchangeably. Local containers used

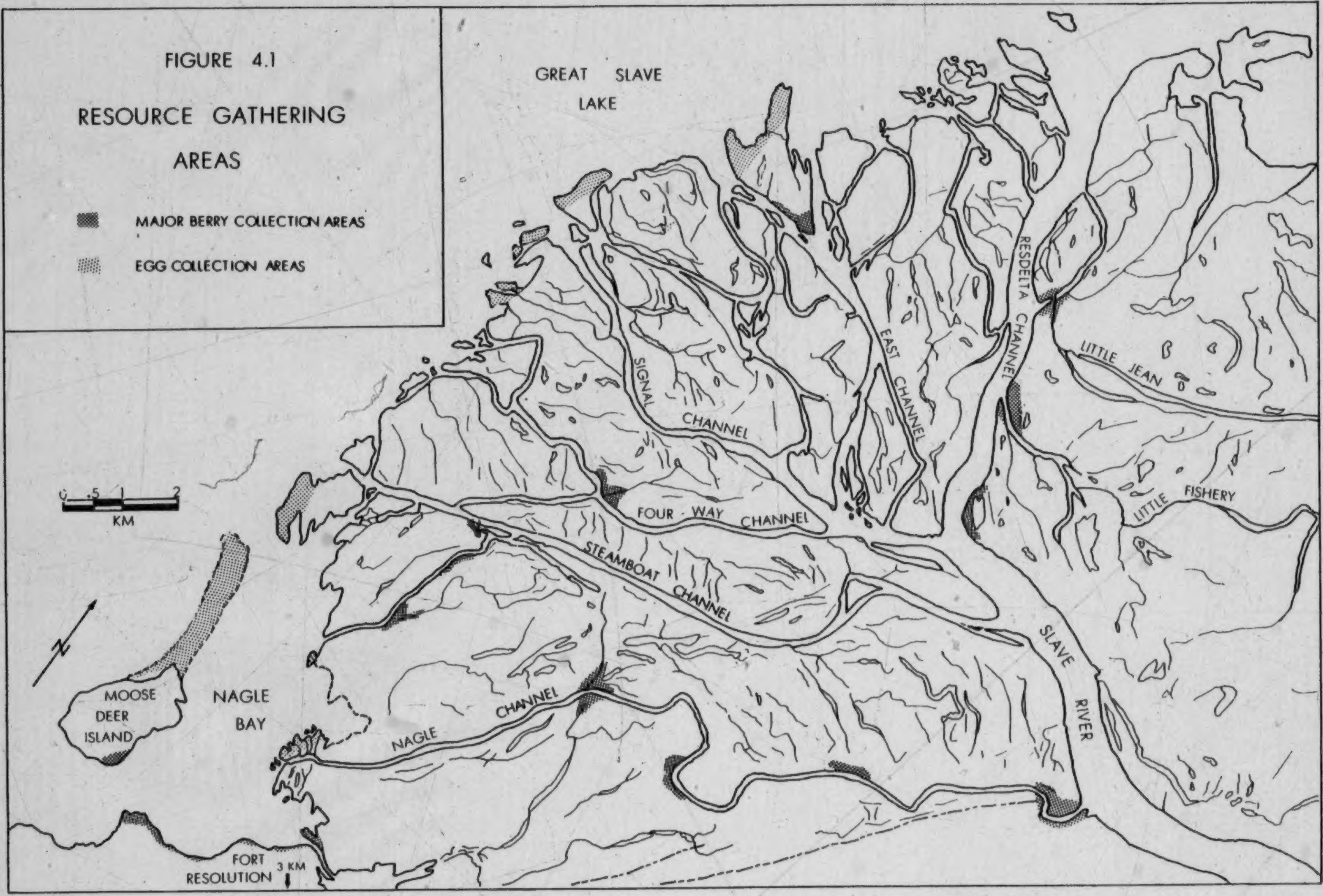

FIGURE 4.1

RESOURCE GATHERING AREAS

▩ MAJOR BERRY COLLECTION AREAS
▒ EGG COLLECTION AREAS
GREAT SLAVE LAKE
RESDELTA CHANNEL
LITTLE JEAN
EAST CHANNEL
SIGNAL CHANNEL
LITTLE FISHERY
FOUR WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
NAGLE BAY
MOOSE DEER ISLAND
FORT RESOLUTION 3 KM
0 .5 1 2
KM
N

TABLE 4.1

GATHERING PRODUCTION & CONSUMPTION

YEAR	TYPE	SEASON	AV. QUANTITY	INTERVIEW EST. TOTAL
75-6	BERRIES (for food)	late summer to early fall	1.60 kg	258.55 kg
76-7			1.14 kg	184.61 kg
75-6	LABRADOR TEA	year round	insignificant	very slight
76-7			insignificant	very slight
75-6	JUNIPER BERRIES (for medicinal use)	early fall to winter	insignificant	very slight
76-7			insignificant	very slight
75-6	REEDS & RUSHES	early summer to fall	very slight	very slight
76-7			very slight	very slight
75-6	EGGS	late spring to early summer	insignificant	30
76-7			insignificant	36
75-6	MEDICINAL PLANTS	year round	insignificant	rare
76-7			insignificant	rare

varied from plastic bags to canvas sacks and lard tins. Informants were therefore asked to estimate yields using a collection vessel which had a standard size. This was a five pound lard tin. This procedure gave a uniform measurement unit but due to its crude nature, values derived would be assumed to be the minimum level, especially in the case of berries being consumed *in situ*.

4.2.3 Berries

The most common plant material collected by the natives is berries. These include many edible varieties. Cranberries, (*Vaccinium sp.*) , are the most common varieties collected along with raspberries (*Rubus strigosus*). Berries start to ripen in July and are collected into the month of September. Other varieties harvested include black and red currants (*Ribes spp.*), gooseberries (*Ribes oxyacanthoides*) and occasionally strawberries (*Fragaria vesca*).

Berries are usually collected by the family unit, especially the women and children while in the bush camp. As a result, the majority of the berries are gathered in the vicinity of the camps (Figure 4.3), established for hunting and trapping. As stated above (section 4.2.1), the wide availability of berries throughout the delta, makes this possible. Other areas utilized are those closest to the airport landing or Nagle Landing because of road access (Figure 4.3) or well travelled channels.

Berries are usually eaten fresh, raw or with sugar and in the vicinity of where they were picked. Berries that are not eaten in the field are preserved by being frozen in household freezers. Freezers are common in households and all households have access to the community freezers. Preservation of berries by drying in the cool autumn air is no longer done, and as a result there is no pemmican being produced. Previously, in the early fur trade days (1800's), the settlement of Fort Resolution exported pemmican as well as vegetables (Innis 1970).

4.2.4 Eggs

Nests of migratory birds are raided early in the summer. Waterfowl nests are usually found by accident and the eggs are taken whenever possible. Egg collection from gull nests is a planned venture and is usually confined to nests on the spit development north of Moose Deer Island (Figure 4.1). Yearly harvest is usually limited to a few dozen eggs.

4.2.5 Plants

Plant matter other than fleshy fruit is occasionally gathered in the delta. Labrador tea is rarely collected, and usually only by the older females who are in the bush camps. The same can be said for the reeds and juniper berries.

Plant material collected for medicinal purposes is not openly discussed but the amount is believed to be insignificant, as the older informants expressed the view that the younger participants do not show any interest in learning about the medicinal properties of the plants found in the delta.

Berry production levels are determined by two main factors: climatic conditions and effort as determined by length of stay in the bush camps. [7] In years of low precipitation the berry crop is ignored by most of the residents of Fort Resolution and most of the production is confined to the families staying in the study area. The length of stay in the camps during the harvest period (July-September) is the main factor in determining production levels.

Garden plots were kept at a few of the more permanent camps (Figure 4.3) but have been abandoned in recent years. A major reason for this is that the former production of root crops such as potatoes, which totalled a few hundred pounds, has been replaced by commercially available produce. Although previous levels of production from gathering activities were small, the activity has been maintained despite commercially available substitutes. The chief controlling factor in the volume produced appears to be the success of the other related resource activities and the maintenance of the bush camps.

4.3 Fishing

Fish form a valuable and indispensable form of food for the natives of Fort Resolution. Traditionally fishing has provided forty percent of their food supply. With the increased dependence on imported food stuffs, the amount of fish harvested has declined although it has still maintained an important role in the native economy. Fish are a staple food, relied upon to fill in for the inadequacies in other country food supplies. Given the choice, the natives will forego fish in favour of red meat, believing that the fish, although healthy, will not supply all their needs if depended upon totally. Decline in the use of the resource is evident in the lack of dried fish and related products despite large quantities of fresh fish available locally, (also the absence of drying racks or presence of fish after the previous day's catch).

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[7] Sites used for bush camps often provide availability to water, good docking facilities, ample wood supply and access to resource areas.

The large quantity of dissolved and suspended mineral materials in the turbid waters of the Slave River Delta has led federal fisheries personnel to conclude that no fishing, either domestic or commercial, is carried out in the Slave River Delta area (Keleher 1966). However, there have been no studies completed by the federal authorities of the domestic fishing to verify that this conclusion is true. Most of the delta is within the ten mile protected domestic fishing zone set up to protect fish resources for the residents of the settlements on the south shore of Great Slave Lake (Figure 4.2). Information collected during the study period indicates that domestic fishing does in fact take place. Areas of the delta utilized are shown in Figure 4.2. These resource areas have a history of past use and rights to the fish resources are usually assigned to the family camps located in the vicinity.

The quantities of the major species of fish harvested over the study period are summarized in Table 4.2. Estimated amounts were obtained from the interviews conducted with 103 households representing 162 males potentially active in traditional activities. The reliance on the interview technique caused some problem especially in terms of loss of memory. With smaller or more common fish such as whitefish, the exact number taken was were harder to recall than the larger less frequently caught species such as inconnu. Units of measurement also vary between

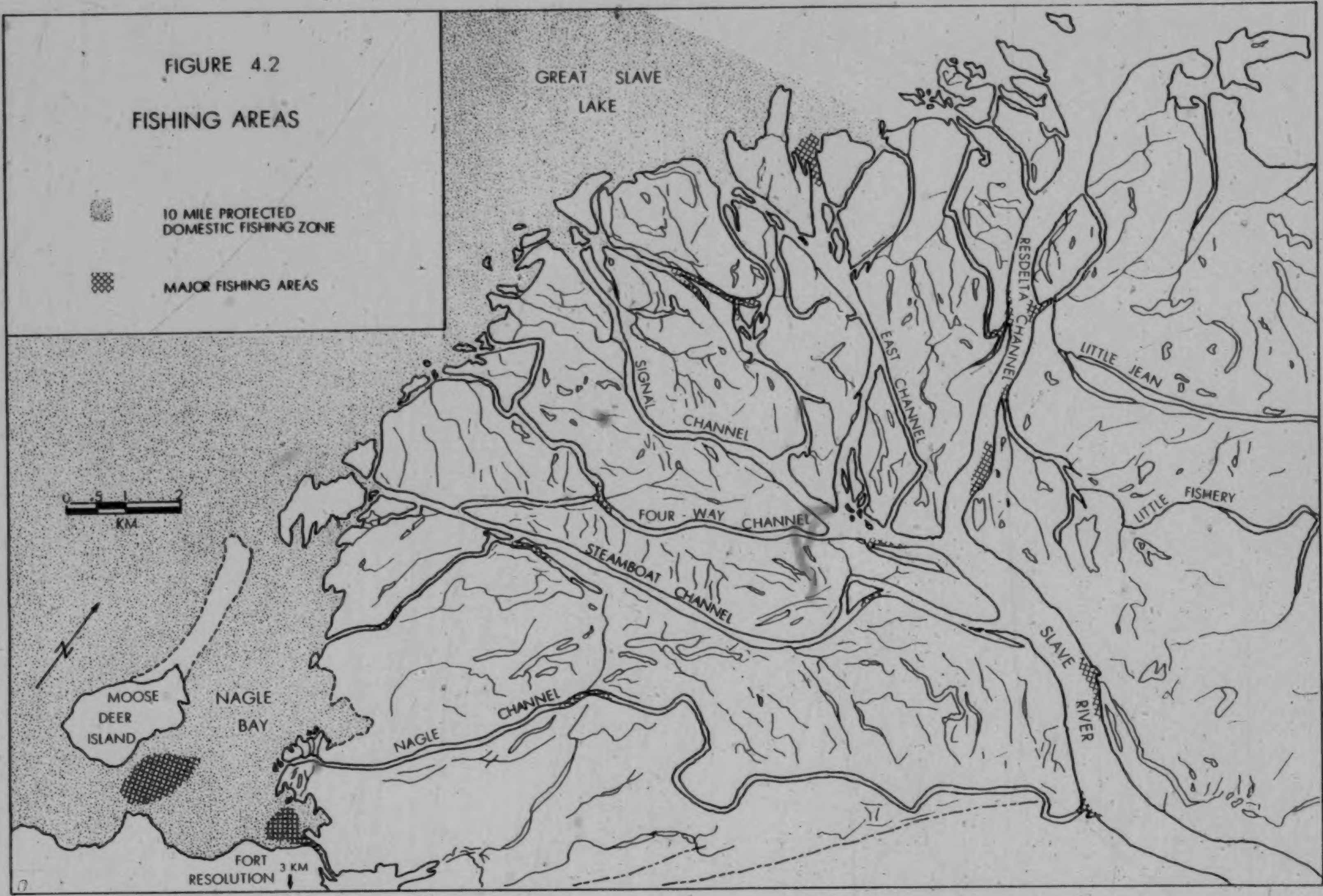

FIGURE 4.2

FISHING AREAS

10 MILE PROTECTED DOMESTIC FISHING ZONE
MAJOR FISHING AREAS
GREAT SLAVE LAKE
RESDELTA CHANNEL
LITTLE JEAN
LITTLE FISHERY
EAST CHANNEL
SIGNAL CHANNEL
FOUR - WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
NAGLE BAY
MOOSE DEER ISLAND
FORT RESOLUTION 3 KM
0 .5 1 2
KM

TABLE 4.2

FISH PRODUCTION AND CONSUMPTION

YEAR	TYPE (Common Name)	AVERAGE NUMBER PER INTERVIEW[1]	ESTIMATED TOTAL NUMBER	AVERAGE WEIGHT	TOTAL WEIGHT CONSUMED: DOG	TOTAL WEIGHT CONSUMED: HUMAN
75-6	Whitefish	12.65	2050	[2] 31 oz	891.75 kg	891.75 kg
76-7		15.43	2500	.870 kg	1087.5 kg	1087.5 kg
75-6	Maria	20.62	3340	[3] 69 oz	4582.48 kg	1963.92 kg
76-7		27.16	4400	1.96 kg	6036.8 kg	2587.2 kg
75-6	Northern Pike	3.67	595	[4] 86 oz	874.62 kg	583.08 kg
76-7		4.72	765	2.45 kg	1124.55 kg	749.72 kg
75-6	Cony	2.68	435	[5] 120 oz	884.76 kg	589.84 kg
76-7		5.62	910	3.39 kg	1850.94 kg	1233.96 kg
75-6	Sucker	7.04	1140	[6] 51 oz	1487.7 kg	165.3 kg
76-7		6.48	1050	1.45 kg	1370.25 kg	152.2 kg
75-6	Walleye	—	—	[7] 42 oz	--	--
76-7		.55	90	1.19 kg	0	107.1 kg

*N = Sample Size

1 N=162 2 N=133 3 N=92 4 N=37 5 N=236 6 N=335 7 N=39

informants, some expressing values in terms of weight while others used the approximate number. Burbot were commonly expressed in terms of weight while whitefish were numbered, the differences being due to different preservation techniques (see section 4.3.2).

If the informants found difficulty in responding in such abstract terms as numbers or weights, they were asked to relate their harvest to the number of days it would feed their family or dogs. Total weights were calculated from average weights obtained from fresh field samples, taken from the spring into the fall, to reduce the chance of seasonal variation in fish weight. Weight reduction due to drying or cooking (approximately 50 percent) was ignored (Lantz and Iredale 1971). Most fish are harvested from the delta during spawning periods and therefore, the estimated final weight totals given for each species, are thought to be minimal estimates. What they represent are the only estimates available for the domestic fisheries in the Fort Resolution area.

4.3.1 Maria

In response to the decline in lake trout numbers (Section 4.3.7), burbot (Lota lota) (local name: maria) have replaced them as the main predator in the west end of Great Slave Lake. Large numbers of maria are caught in the distributary channels of the delta from late October until mid-December. [*] This corresponds with their spawning run up the Slave River. Fishing is usually done through the ice using set lines or short gill nets between twenty-five and fifty yards long. Maria tend to tangle and twist the nets when caught, reducing the efficiency of the nets, and making them more difficult to check. The preferred set lines have either single or multiple hooks and ten to twelve lines may be used at one time. The hooks are baited with pieces of whitefish flank and checked approximately every four hours. Catches of forty to fifty fish a night are not uncommon.

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[*] Although maria represent the major fish species and one of the main products from the delta in quantity and are prized for human consumption, the large proportion of the flesh is used for animal food. This results in a decreased importance in relation to other animal products in dollar value (Section 5.3).

When cleaned the highly prized eggs and pale white liver are removed to be saved with the flesh. Intestines are fed to the dogs. The flesh used for human consumption is cut transversely along the sides and boiled in a broth along with rice or oatmeal. Occasionally, the heads are also boiled yielding tender portions of meat. Fish destined for dog food are set on racks to semi-rot or freeze in the cool autumn air and fed to the dogs in a frozen state throughout the winter, one to two kilograms (2-4 lbs.) per animal per day.

4.3.2 Whitefish

The most prized fish in the Slave Delta is the whitefish (Coregonus clupeaformis). The numbers harvested are not as great as maria but their local significance is reflected in the large proportion used for human consumption (Table 4.2) and their relative position in order of income generated (Section 5.3). This widely distributed fish is a staple in most northern diets (Helm and Leacock 1971; Schaefer 1977). Small numbers are caught in the shallow waters of the outer delta just after spring break-up but the majority are harvested during their fall migratory run up the Slave River, in September and October. Fish are netted in similar locations each year (Figure 4.2).

Nets up to fifty yards long are set in water up to 4.5 meters (15 feet) deep and are checked twice a day during the period of peak run (see Plate 4.1). Nets must be lifted before freeze-up and reset after ice conditions are safe enough. If nets are set below ice, greater exertion is required to check them. This, along with the preserving qualities of the colder water, also reduces the need and desire to check the nets as frequently.

Nets are usually purchased from Hay River or obtained through government aid programs. Most commonly used nets are fifty yards (46 m.) long, forty to sixty inches (100-150 cm.) deep with a five inch (12.7 cm.) mesh size. ' Weights and floats are purchased along with the mesh. When nets are set in open water, they are weighted with large rocks and marked with pieces of driftwood or floats made from outboard oil containers (Plate 4.1).

The gills of whitefish are checked when pulled from the nets, those still red being fit for human consumption and the paler drowned fish being used for dog food. Once separated, different means of preservation are employed. Fish destined for dog food are skewered through the tail with a length of willow and allowed to dry in the crisp autumn air, although they partially decompose. Hang or stick fish are

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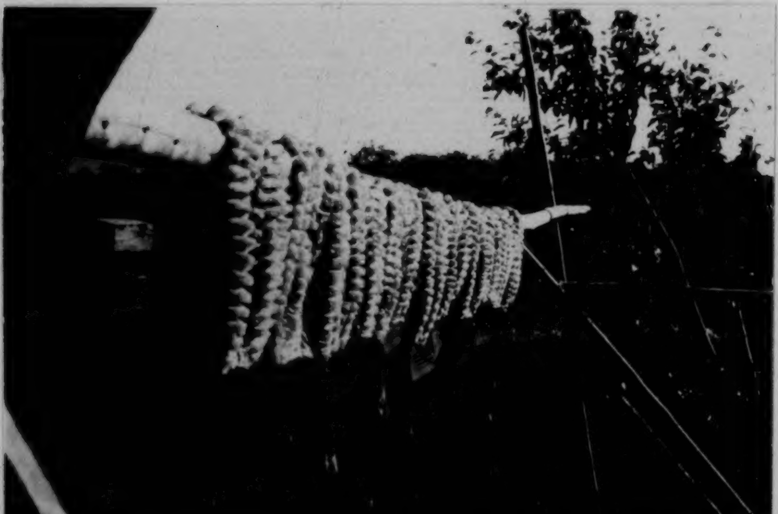
' Most nets used by the natives of Fort Resolution for the domestic fishery are either twenty-five, fifty or one hundred yards long. Mesh sizes range from three to five inches. Mesh measurements are taken on the diagonal of the mesh when it is wet. The depth of the nets varies but is usually measured in numbers of mesh deep. Conversion of nets to metric measurements has been slow in the community, with only a few commercial fishermen having the newer nets.

4.1 Johnny Beaulieau checking fish nets. Most fishing boats are of similar plywood construction. Driftwood buoy in the foreground marks the location of the net.



4.2 Longnose suckers drying in the summer sun. Cubed flesh is left attached to the skin. Fish are placed under smoke at night.

the usual means for preserving fall whitefish. If caught during warmer weather the fish are smoked and dried.

Once cleaned and washed, the flesh of fish destined for human consumption is separated from the bones, serated with skin intact and hung over poplar or willow wood fires to smoke. Once smoked it is allowed to dry in the sun for two to three days (see Plate 4.2).

4.3.3 Longnose Suckers

Longnose suckers (Catostomus catostomus) are numerous in the outer delta shortly after spring break-up (Plate 4.3). Dogs consume the flesh fresh while human consumption is in the dried form (similar to whitefish) or boiled. Production is short lived (mid-May to mid-June) because of the decline in numbers and the shift of netting activity from the study area to Resolution Bay.

Successful procuring of a winter's supply of fish for dogs is controlled by the timing of the netting operation. The winter's dog food can be successfully obtained if the family unit is operating during fall run periods and has cool enough weather to produce hang fish. Unlike other northern native groups (Honigman 1961), fishing is the responsibility of the males, with the women being responsible for the curing process. Equipment in good condition (nets, hanging racks) reduces the effort needed to procure adequate supplies. The level of production appears to be determined by, however, the number of natives in the delta during peak run periods, high levels being achieved when hunting and trapping conditions are good in the delta (Plate 4.4). The overall quantity of fish caught and processed from the delta appears to

4.3 Fish camp on Moose Deer Island shortly after spring breakup. Nets are set in the immediate foreground and the fish dried at the camp.

4.4 Gabe Lafferty's fall fishing camp near the outlet of Signal Channel. Walled tent camp also doubles as a ratting camp.

be largely determined by the number of dogs that are owned by the natives utilizing the resources of the delta during peak fish runs. The numbers of dogs are not available from previous years but present numbers are similar to those given for Snowfrift in 1965 (An average of one dog for every native inhabitant) (Keleher and Haight 1965).[10] Therefore, it would appear that fish production has little reason to decline drastically from those levels. Commercial fishing has reduced the size of the fish being caught but the fishing is generally considered good locally (Keleher 1972).

4.3.4 Northern Pike

Northern pike (Esox lucius) (local name: jacks) are found in relatively stable numbers year round, with concentrations during the spring high water period. Jacks caught by rod and reel are usually eaten fresh but those caught in the periods of netting are used as hang fish. The flesh of the fish is not highly prized for either human or animal consumption.

4.3.5 Inconnu

Inconnu (Stenodus leucichthys) (local name: cony) are caught in the delta in conjunction with the harvest of the whitefish run. Cony are highly prized for dog food because of their rich oily flesh. Drying differs from the whitefish in that the flesh is filleted from the bone completely and alternated between smoking at night and drying in the sun for a longer period. Hang fish made from inconnu consist of six fish per stick instead of the ten usually used for the smaller whitefish.

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[10] Increased use of snowmobiles in the North has been blamed for reduced amounts of fish harvested because fewer dogs are needed for hauling. Although snowmobiles are popular in Fort Resolution, the numbers of dogs has remained relatively high (over 400) because of the local interest in racing and the use of dogs in the outpost camps during the winter.

4.3.6 Walleye

Walleye (Stizostedion vitreum vitreum) are rarely caught in the study area and are primarily used for human consumption.

4.3.7 Lake Trout

In 1945, Great Slave Lake was opened to commercial fishing fleets, which concentrated on lake trout (Cristnomer namaycush) and whitefish (Coregonus clupeaformis) (Keleher 1972). Fishing pressure increased to the point where lake trout stocks were seriously depleted in the western end of the lake (Keleher 1972). Fort Resolution natives used to catch large trout on lines set through the ice near the channel discharges in the outer delta. No trout were caught during the study period and no effort to set lines was observed.

4.4 Hunting

Hunting in the Slave River Delta can be divided into small and large game categories. This will be done to reflect the differences in harvesting techniques and effort between the two groups of game pursued. Small game is usually ignored or represented by incomplete data in most attempts to record country food production. Small game listed in Table 4.3 is composed of birds, excluding the snowshoe hare which are more commonly snared than shot, thus, they are considered under trapping activities (section 4.5).

TABLE 4.3

HUNTING PRODUCTION & CONSUMPTION

YEAR	TYPE	AVERAGE PER INTERVIEW	ESTIMATED TOTAL QUANTITY	AVERAGE EDIBLE WEIGHT	TOTAL WEIGHT KG	TOTAL WEIGHT CONSUMED: DOG %	TOTAL WEIGHT CONSUMED: DOG KG	TOTAL WEIGHT CONSUMED: HUMAN %	TOTAL WEIGHT CONSUMED: HUMAN KG	TOTAL WEIGHT[5] ALTERNATE USE %	TOTAL WEIGHT[5] ALTERNATE USE KG
				SMALL	GAME						
75-6	PTARMIGAN	24.92	4037	[1] 13 oz	1485.6	[4] 30	445.7	[4] 70	1039.9	[4] 0	0
76-7	Lagopus lagopus	34.18	5537	.368 kg	2037.6	30	611.3	80	1426.3	0	0
75-6	GROUSE	3.83	620	11 oz	192.8	10	19.3	90	173.5	0	0
76-7	Various species	3.05	494	.311 kg	153.6	10	15.4	90	138.2	0	0
75-6	DUCKS	23.86	3865	27 oz	2956.7	0	0	100	2956.7	0	0
76-7	Various species	25.31	4101	.765 kg	3137.3	0	0	100	3137.3	0	0
75-6	GEESE	3.80	616	56 oz	977.5	0	0	100	977.5	0	0
76-7	Various species	3.05	494	1.587 kg	783.9	0	0	100	783.9	0	0
				LARGE	GAME						
75-6	MOOSE	.160	27.5	[2] 228.3 kg	[3] 6278.4	0	0	100	6278.4	0	0
76-7	Alces alces	.055	9	205.8 kg	1852.3	0	0	100	1852.3	0	0
75-6	BEAR	.142	23	92.55 kg	2128.7	20	425.7	60	1277.2	20	425.7
76-7	Ursus americanus	.074	12	107.25 kg	1287.1	20	257.4	60	772.3	20	257.4

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1 Source: Northern Frontier, Northern Homeland. Thomas Berger, Table 1.9 Volume 2 1977.
2 From interview sources.
3 Based on interviews: similar values to that in 1.
4 Percentage values of total production.
5 Wastage, bait, spoilage

4.4.1 Small Game

Small game animals include migratory waterfowl (ducks and geese), ptarmigan and grouse (Table 4.3). Areas hunted differ for the species, being influenced by migratory habits of the ducks, geese, and ptarmigan, and the more sedentary grouse species.

Hunting, for both small and large game, provides the natives with a supply of preferred meat. Red meat from moose and bear is valued above that of the game birds but both are preferred to fish flesh. Meat provided by hunting is thought to be psychologically satisfying to eat as well as providing nutrient needs. Hunting is actively pursued in comparison to the more mundane activities such as fishing or wage employment. Production of meat by hunting is increasing in importance because of the increasing cost of imported food stuffs, especially since imported meat products are thought to be inferior and not as healthy (Table 3.1).

Spring and fall fowling for ducks and geese takes place in the outer delta areas while the inner distributary channels are used for duck hunting only (Figure 4.3). Summer activity is more intensive along the contact zone between the inner and outer delta (see English 1979). Fall migrations of willow ptarmigan concentrate hunting pressure along the edge of the delta abutting the lake. Grouse hunting is more general in the areas covered, except for the sharptail grouse which are found in similar habitat as the willow ptarmigan.

The amounts of game produced by hunting from the Slave River Delta over the two year period was obtained from individual interviews and

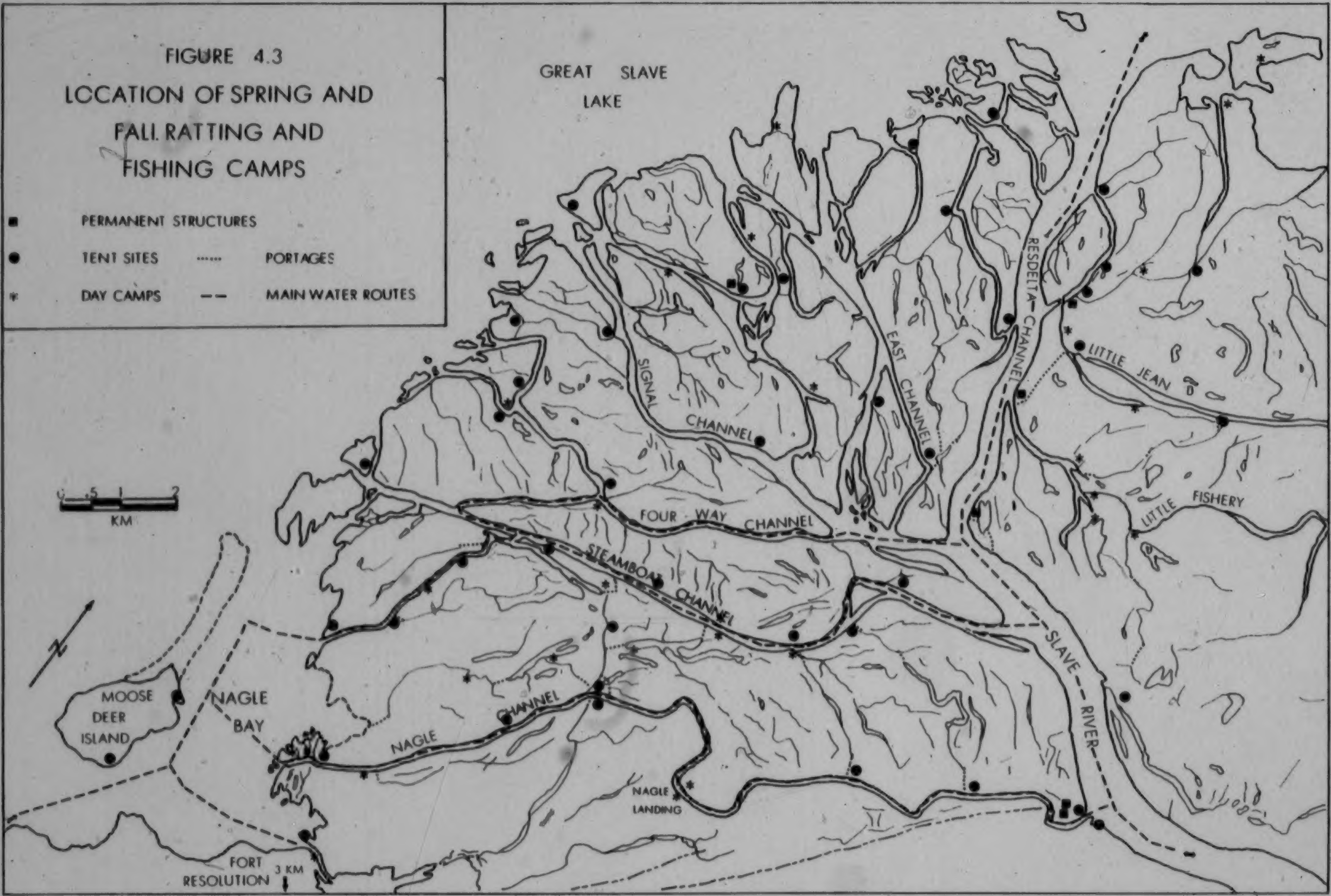

FIGURE 4.3
LOCATION OF SPRING AND FALL RATTING AND FISHING CAMPS

■ PERMANENT STRUCTURES
● TENT SITES
...... PORTAGES
* DAY CAMPS
– – MAIN WATER ROUTES
0 .5 1 2
KM
N
GREAT SLAVE LAKE
RESDELTA CHANNEL
LITTLE JEAN
LITTLE FISHERY
EAST CHANNEL
SIGNAL CHANNEL
FOUR WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
NAGLE LANDING
NAGLE BAY
MOOSE DEER ISLAND
FORT RESOLUTION 3 KM

participant observation (Table 4.3). Estimates were checked against General Hunting License returns, the official records kept by the territorial government. Amounts obtained are at best an estimate. The degree of accuracy given by the aggregate values is misleading, because some informants were exact in the numbers harvested while others were only able to approximate their harvest.

4.4.2 Data Problems

Figures given for waterfowl (ducks and geese) are aggregate values for each year. No attempt was made to distinguish between the spring and fall harvest. Also included under the category of ducks is a variety of shorebirds. The category of geese includes sandhill cranes and swans. As a result of the inclusion of birds shot during closed season, and birds protected by migratory bird laws, the values will probably be less than the actual harvest, because of social pressure against illegal activities, mistrust of the interviewer, and the greater weight of the protected birds such as swans and cranes compared to geese. (Hunting restrictions are listed in Appendix III).

4.4.3 Ptarmigan

During good years, such as experienced during the study period, ptarmigan (Lagopus lagopus) are the most numerous bird harvested. [11]

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[11] The large numbers harvested are not indicative of the local importance of the species. This is shown better by the proportion used for human consumption (Table 4.3). Migatory waterfowl, although not as numerous in harvest numbers in peak years, are much more important because they can be relied on each year. The importance of the ptarmigan resource is also misrepresented in terms of dollar value in Section 5.3 because of the lack of a distinquishing local substitute value between ptarmigan and waterfowl.

Large flocks of birds pass through the delta during their southern migration from the tundra in late fall. The birds are very abundant for a four to five day period, during which most of the community takes part in the hunt. Anyone who can fire a shotgun or .22 calibre rifle takes advantage of the abundance of meat. Birds shot are allowed to freeze in the cool November air if not used fresh. The great abundance of meat in such a short time period, lowers its value as a food source. As a consequence, birds deemed as surplus are fed to the dogs rather than being preserved for consumption later. Birds are consumed by households and rarely sold, and if so, then mostly as dog food. Aside from the brief period of abundance, ptarmigan are shot whenever encountered in the study area, birds being found in groups of one to three along willow or alder-lined channels or along the edge of the lake. Birds prepared for human consumption are skinned, viscerated, saving the heart and lungs and are fried in lard.

4.4.4 Ducks

Aggregate totals for various species of ducks harvested during the study period were smaller than those for ptarmigan but are of greater importance to the local population. Unlike the unpredictable ptarmigan, large flocks of ducks can be counted on to spend two to three weeks in the delta twice a year. Furthermore, in addition to the concentration of ducks in the spring and fall, the delta has a resident breeding population over the summer.

Spring hunting of ducks is illegal (Migratory Bird Regulations; Appendix III) but the legalities are usually overlooked by both natives and enforcement officers. Spring ducks are fat and in good condition, possessing better flavour than in the fall. Large flocks of waterfowl congregate in the delta in the spring shortly before break-up (late April) and depart near the end of May. Native hunting with 16- or 12-gauge shotguns begins as soon as the birds start to arrive. Most of the birds are harvested in the first few weeks of open water before the ducks become 'spooky' (nervous or skittish). The exposed mud flats (Plate 1.1) and old equisetum beds provide good hunting in the outer delta. Pass shooting in the outer delta is from boats or portable blinds in the driftwood areas near the mud flats. [13] Ducks shot in the inner delta are often taken from canoes or motorized craft as they move along the numerous channels. This method of hunting is continued into the summer. Production declines until late August when ducklings have grown sufficiently in size. Canoes are used to hunt the year's young ducks along the equisetum-potamogeton areas of the outer delta. Hunting increases with the fall influx of birds about mid-September and continues until freeze-up (November).

Most ducks are shot and retrieved by boat, crippled birds often being lost in the large equisetum beds of the outer delta. Additional ducks are occasionally taken in muskrat traps set on logs or platforms. Cool, overcast days are more productive than bright days, and hunting is best in early morning or at dusk.

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[13] Pass shooting is usually done at the outer edges of the delta. Hunters remain hidden in driftwood blinds or in their boats until migratory waterfowl pass within shotgun range (30-50 meters). In the spring and fall when the concentration of migratory birds is high and a large number of natives are in the delta, pass shooting is particularly successful because the birds are constantly being disturbed and moved about the delta.

Mallards (Anas paltyrhynchos), lesser and greater scaups (Aythya spp.), widgeon (Mareca americana) and teal (Anas crecca carolinensis) are most commonly taken, with the dabblers or puddle ducks preferred to the divers. Fish ducks such as mergansers (Mergus spp.), scoters (Melanitta perspicillata) are ignored or thrown away if taken at all. The birds are prepared in the same manner as ptarmigan, but are boiled more often than fried or roasted over open fires. Ducks not eaten fresh are frozen in home freezers or in the community freezer.

4.4.5 Geese

Geese arrive in the delta at the same time as the ducks but they tend to restrict themselves to the outer delta and spend a shorter time in the area. Resident broods are not common. Successful goose hunting is restricted to those natives who spend a long time hunting from blinds in or near the mud flats in the spring or equisetum beds in the fall. Hunters who regularly take large numbers of ducks, often have correspondingly large geese harvests. Greater effort is required to be a good goose hunter than for other waterfowl. Swans (Olor columbianus) and sandhill cranes (Grus canadensis) are often shot but the true extent is unknown because of the illegal nature of the activity. Spring harvested geese are considered to be in better condition than those taken in the fall.

Meat is either boiled in a broth or roasted over an open fire. Occasionally the flesh is cut into strips and dried over a smoky fire.

4.4.6 Grouse

Grouse (local name: chicken) were rarely seen during the observation period, but three species were identified, willow grouse (Bonasa umbellus), spruce grouse (Canachites canadensis), and sharptail grouse (Pedioecetes phasianellus):

The author believes the values given for the grouse harvest to be excessive, based on observed activities. Problems may be due to the confusion of where birds were obtained, memory bias, and an attempt to please the interviewer.

Large flocks are uncommon and birds are usually taken when encountered while the hunter is engaged in other activities. Unlike ptarmigan and waterfowl, their numbers are relatively stable year to year and year round. Sharptail grouse appear to be the most common species taken, followed by willow grouse. Thick coniferous forest cover, preferred by spruce grouse or fool hens, is restricted in area, and so numbers harvested are low (see Figure 4.6).

4.4.7 Owls and Gulls

A few owls are caught in fox traps set on muskrat winter houses in the outer bays of the delta but are not used for food other than for dogs. Occasionally, gulls are shot for pestering nets or merely for target practice, never for consumption, the carcass being discarded.

4.4.8 Large Game

Hunting for large game provides the native hunter with a valuable source of nutrient-rich red meat but also is an activity that is undertaken with great pleasure, interest and emotional attachment. Red meat is preferred to other forms of flesh. [13] Deltaic habitats have the greatest potential to support moose (Alces alces) populations with high densities (Dirschl 1973). The moist conditions also create ideal conditions for berry production and this attracts a large black bear (Ursus americanus) population. These two large mammals represent the only types of big game in the delta. Caribou have been known to pass along the lake but have not done so in the last twenty years. Main areas of activity are along the main channels and any area accessible by water.

Aggregate estimates for the 1975-76 and 1976-77 big game harvest were obtained from interviews with the natives who use the Slave River Delta (Table 4.3). Information was checked against General Hunting License returns for the same years and because of the following reasons, the values are assumed to have greater validity than those given for small game. Kills of large animals, in general, are not common, they produce much more meat, require greater effort, have greater emotional value attached to them, and are subsequently not easily confused or forgotten. Partial kills were recorded if partners split a kill and meat left the Fort Resolution community. Natives reporting kills were asked to identify their partners to avoid double counting of kills.

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[13] The large amount of red meat for human consumption from a single kill is shown in Table 4.3, where even in poor harvest years such as 1976-1977, a large amount of country food was generated by the moose harvest.

4.4.9 Moose

Moose are the most highly prized source of country food available to the people of Fort Resolution. Natives believe that moose move into the delta's islands in the spring to get away from wolf predation. The thick understory of bush, numerous channels, and deep water provide ideal habitat in which calving can safely take place. While the delta provides excellent protection from some animal predation, it also is a prime breeding area for blood-sucking insects such as mosquitos and deer flies. These pests indirectly lead to hunter success. High concentrations of insects during the hot, calm mid-July nights force moose from the protected interior of the islands into the deeper water of the main channels to escape insect harassment. Under such conditions, usually between midnight and 5.00 a.m., the channels of the delta are alive with local residents hunting moose from canoes or motorized boats. Hunters circle the islands looking for fresh tracks in the mud-banks, for trails broken through the equisetum or for moose hair floating on standing water. Use of 'kickers' (outboard motors) has reduced hunting success, scaring the animals before a shot can be taken with a 30.30 or .303 calibre rifle. If found in mid-channel, the animal can not be shot until it is in shallow water, or it will sink, only to surface two or three hours later downstream after drifting.

Once beached, the animal is cleaned saving all the edible portions including the first stomach (bible), the fat encasing the stomach, heart, lungs, liver, kidneys and head. Moose taken in the delta are usually quartered, loaded into boats and taken back to the settlement. Dry meat is rarely made in the delta, despite being highly prized.

Access to the community freezer has meant that it is easier to freeze the meat immediately rather than undertake the laborious task of cutting the meat into thin strips and hanging it in the sun over smudge fires. Locations of kills are often marked by pinning the ears to trees, leaving antlers, or by old skinning tripods.

Although little meat is wasted and edible portions of the internal organs are saved, few hides are preserved. Smoke tanning has been replaced by hides being discarded or burned.

Moose hunting is not confined to the summer but occurs in all the seasons. The fall rut period is also productive but the study area is almost deserted during the winter, reports of tracks or animals sighted being infrequent.

Meat is cut into convenient sized pieces for frying, roasting, or boiling. Boiling is the most common form of cooking, the broth being augmented with rice or potatoes.

4.4.10 Black Bear

Black bear (Ursus americanus), both the black and cinnamon varieties, are distributed throughout the delta. Hunting trips are not made solely for bear (unlike moose), but the animals are shot whenever seen. Animals are also taken with wire snares set along known game trails or stream crossings. Superstitions are associated with bear, making some individuals avoid these animals. Good berry crops, especially bear berry (Cornus canadensis), attract large numbers of the animals to the delta's berry producing communities in the fall. Bears are frequently shot when they are feeding along the water's edge or swimming the channels. Bears are a nuisance, destroying camp equipment and food and are potentially dangerous, especially in the spring. Spring hunt is always a joint effort, two or more men taking part in case of attack.

The customs of shooting bears in deep water, of not following wounded animals into thick bush and of discarding carcasses because of superstition or dislike of the flesh, result in wastage of otherwise edible meat. The hunting of bears for hides or for 'sport' wastes a rich source of red meat, a situation not found with regard to other game species hunted. If the pelt is in good condition (early spring and late fall) kills are field dressed, skinned and quartered and then transported for storage in either household or community freezing facilities. Animals taken during the summer are quartered and transported with the hide intact. Because the summer pelts are often in poor condition, no attempt is made to keep them. After freezing, the meat is prepared in the same manner as moose meat, boiling being the most common form of cooking. Bear meat for dogs is consumed fresh within a day or two. Good hides are prepared by stretching and nailing the hide on a flat surface, usually the side of a building, scraping excess fat and flesh off, and allowing it to dry in the sun, occasionally wiping off grease sweated out by the heat.

Little dry meat is prepared from either moose or bear for two reasons. The women who traditionally prepare the strips of meat for smoking and drying are in town during the most productive hunting periods for large game (late summer) and because of the ease of access to freezing facilities in Fort Resolution. Fresh meat is preferred to meat that has been dried or smoked so flesh is frozen whenever possible.

4.5 Trapping

Trapping activity has provided the native economy with the most visible and viable connection with the market system. Cash generated from the sale of furs has enabled the native hunter/fisherman to maintain the hunting and fishing activities which provide an indispensable meat source for his household. Past attempts to record these activities have failed to take into account the large quantities of country food produced. For example, due to the poor design of the existing fur recording system, the food value of the fur-bearing resource is not recorded despite the fact that the quantity of food produced is potentially in excess of hunting and fishing production.

Production of meat by trapping for fur is presented in Table 4.4. Values were obtained from interviews and were cross-referenced with the data given by the fur export books. Fur export figures are hard to apply however, because of the habit of selling furs under the General Hunting License numbers of immediate or extended family members. [14]

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[14] Pelts sold under a General Hunting License can not always be attributed to the labours of the license holder. Furs are often sold by members of the trapper's extended or nuclear family. This is done for a number of reasons. The recorded income of the trapper can be kept as low as possible so that rent payments are kept low, since rent and utility payments are tied to income levels. The low recorded income may also mean the trapper is eligible for welfare or transfer payments. The Fur Rebate Program also encourages the practice, especially with good trapping results. The upper limit on the fur rebate means that the trapper will not receive any payments for furs valued over three thousand dollars, so he will sell only a portion under his own license and the rest under his wife's or another relative's. No women are known to trap from the community of Fort Resolution but furs are often

TABLE 4.4

TRAPPING PRODUCTION & CONSUMPTION

YEAR	TYPE	AVERAGE NUMBER PER INTERVIEW	ESTIMATED TOTAL NUMBER	AVERAGE WEIGHT PER CARCASS	TOTAL WEIGHT CONSUMED: DOG		TOTAL WEIGHT CONSUMED: HUMAN	
					%	KG	%	KG
75-6	Beaver	.56	91	285 oz	10	73.52	90	661.67
76-7	Castor canadensis	.33	54	8.079 kg	10	43.63	90	392.64
75-6	Muskrat	230.6	37,366	26 oz	60	16,523.24	40	11,015.50
76-7	Ondatra zibethicus	175.3	28,398	.737 kg	60	12,557.59	40	8,371.73
75-6	Mink	.41	67	30 oz	90	51.26	10	5.60
76-7	Mustela vision	.55	90	.850 kg	90	6.88	10	7.65
75-6	Marten	.02	4	20 oz	90	2.04	10	.226
76-7	Martes americana	.03	6	.566 kg	90	3.05	10	.339
75-6	Fisher	.01	2	70 oz	90	3.57	10	.397
76-7	Martes pennanti	.01	2	1.984 kg	90	3.57	10	.397
75-6	Lynx	0	0	190 oz	20	0	80	0
76-7	Lynx lynx	.01	2	5.386 kg	20	0	80	10.68
75-6	Squirrel	.93	150	16 oz	90	61.15	10	6.795
76-7	Tamiasciurus hudsoniax	1.36	221	.453 kg	90	90.09	10	10.01
75-6	Weasel	.75	122	5 oz	0	0	0	0
76-7	Mustela erminea	1.08	175	.141 kg	0	0	0	0
75-6	Fox	.04	7	96 oz	50	9.53	50	9.53
76-7	Various species	.04	7	2.721 kg	50	9.53	50	9.53
75-6	Rabbit	27.61	4473	36 oz	10	456.24	90	4106.21
76-7	Lepus americanus	43.60	7062	1.02 kg	10	720.32	90	6482.92

[14] Some furs are not recorded when they are used locally for clothing, or are damaged by poor trapping techniques. Based on the above assumptions, the values given are assumed to be minimum values. Animals in Table 4.4 are listed in the same order as they were recorded in the interviews.

4.5.1 Muskrat

Aquatic mammals are the most important animal group harvested by native trappers. [15] Muskrats are so numerous in the delta that 'rats' are recognized as the symbol of the delta for the residents of Fort Resolution (Robinson and Robinson 1946). Muskrat populations have cyclic fluctuations, varying from peak harvests of 40,000 plus to a low of 8,000 (Law 1950). The cyclical nature of this single resource, to a large degree dictates the types of subsistence activity in the delta. During periods of low muskrat populations and resulting poor potential harvest, other resource harvesting activities also decline in the study area. Activity in the delta is high when muskrat populations are peaking as muskrats appear to be the main incentive to spend considerable time in the delta.

Muskrat meat production and its uses vary from year to year. During and after periods of animal disease (actual or supposed) the amount of muskrat meat used for human consumption drops to a negligible level. Such was the case in the winter of 1976 when the muskrat population was drastically reduced by what was assumed to be an outbreak of tularemia (personal correspondence with the local Fish and Wildlife officer, May 1977). Most of the meat was discarded or fed to the dogs when the quality was thought to be inferior. When the harvest is particularly abundant as in 1975, a large portion of the meat is treated in a similar fashion because it is impossible to dry and preserve all the meat.

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[14](cont'd)registered to their General Hunting Licenses.

[15] Muskrats are the primary resource of the Slave River Delta. The represent the bulk of pelt sales in terms of number of pelts and total income generated. They also provide the bulk of the human and animal country food consumed in the community in terms of numbers and estimated dollar value (Section 5.3).

Animals listed under trapping are not harvested solely by trapping techniques. The spring and fall ratting seasons involve the taking of muskrats by shooting and trapping. Information collected allowed the distinction between the two methods but in Table 4.4 the harvest by both methods was presented in one total. In addition, the shooting of hares was not listed separately from those trapped because few animals are taken in this manner. Problems of information validity are most apparent when dealing with small mammals such as hares and muskrats because animals are taken in great numbers when the local population is numerous. Informants often found difficulty in stating harvest numbers, some kept records and were able to give exact figures, while others, in the absence of any data to jog their memories, necessarily had to to generalize. Overall, local informants estimated that the study area provided eighty percent of the annual Fort Resolution muskrat harvest. Data from the interviews tend to confirm this opinion, the study area's total harvest being approximately eighty percent of the settlement's total. Large harvests of small birds and mammals also create problems when attempts were made to determine where they were taken. Confusion may result when the informant is asked to indicate which animals out of a harvest numbering in the hundreds are taken in or out of the study area, especially when the boundaries are unfamiliar to them, being arbitrarily set by the researcher.

Spring ratting camps are set up before the ice goes out on the main river channels used for transportation (Figure 4.3). Equipment is transported on carioles or sleds with steel runners pulled by snowmobiles. Additional supplies and equipment can be brought in after the channels become free of ice. Equipment transported to the camp includes that needed for the full range of subsistence activities (see Table 5.5) (Plate 4.5).

Between the time of setting up camp and the opening of early leads in the ice, men are occupied with preparing equipment for the coming ratting season. Canvas is replaced on freighter and small ratting canoes or new paint is added. Preparations also include the making of trap platforms, fur stretchers, flag markers, and repairing traps (Plate 4.6).

Muskrat hunting is greatest during the trapping season when the channels and lakes are ice-free. Rats are trapped by using floating sets placed along the edges of open water. [14] Number 1 1/2 traps or number 1's weighted with lead are toggled to logs, to vegetation mounds or

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[14] Trap platforms are made from two by six planking with a small diameter hole drilled in the center. An alder or willow branch is driven into the bottom of a channel or lake shore in water up to a meter deep and the platform is placed so that the platform will slide up or down with the branch in the center hole. One or two traps are chained to the platform and set. The platform offers muskrats a place to haul out to rest or feed without leaving the channel or lake. Trapped animals usually dive into the water and are quickly drowned. The free up and down movement of the platform ensures that the set remains operative despite changes in water levels or wave action created by passing boats.

4.5 Nineteen foot canvas freighter canoe beached at Resolution Bay. Shallow draft is suited for travel in the shallow waters of the outer delta and distributary channels.

4.6 Spring ratting camp on Nagle Channel. Camps are usually established before all the snow has melted.

platforms built by hunter/trapper, with enough chain to allow the trapped animal to be drowned. [17] Traps are also placed near bank burrows, feeding stations, and near signs of activity. Trap lines are not registered in the delta, as the area is maintained as a resource area for the general population of Fort Resolution. [18]

Traps are set along the banks of the small distributary channels which lead away from the camp locations. They are marked by flag sticks, usually willow wands with flagging tape attached. Each trapper has his individual colour or combination of flagging colours. Each trap is checked twice a day, once at dawn after the rats' main feeding time between 6:00 a.m. and 7:00 a.m. and at dusk. Muskrats caught in the set are taken back to the camp where they are skinned and cleaned. The cased pelt is then prepared with the flesh side out (Plate 4.7). Once the pelts are stretched and tacked on wooden stretching boards, they are

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[17] Steel traps are identified by a number which is a trade description varying from one manufacturer to another. North American leg-hold trap sizes have been standardized and follow the numbers set by the Newhouse-Oneida Firm. Trap size and number increase the larger the animal it is designed for. Recommended trap numbers are as follows; 1 (muskrat, weasel), 1 1/2 (muskrat, weasel, squirrel, fox, mink, lynx, marten), 2 (marten, fisher, fox, mink), 3 (beaver, fisher), 4 (coyote, beaver, wolverine), 4 1/2 (wolf) and 6 (bear). Traps that catch or hold the animal by the body and are designed to kill the trapped animal (Conibear traps) have a different numbering system. These numbers also increase as the size increases. Conibear trap numbers and recommended uses are; 110 (muskrat, squirrel, weasel), 120 (muskrat, marten, mink), 220 (lynx), 222 (fisher, muskrat) and 330 (beaver, lynx, wolverine, otter, muskrat). Native trappers in the Slave River Delta rarely use the conibear series because of the prohibitive cost of the traps. As a result all references to traps in the text will be to leg-hold traps. (Canadian Trappers Association 1978)

[18] Registered Group Trapping Areas may be registered by a local Hunter's and Trapper's Association or Band Council. Access to the area is then controlled by the group. Registered traplines differ from Group Trapping Areas in that no person other than the registered trapper or his assistant can hunt, trap or be in procession of fur within the boundaries of the trapline.

4.7 Cased muskrat pelts with flesh side outside.

4.8 Muskrat pushup on one of the delta's lakes. Canvas cariole on the toboggan is used to carry trapping equipment and extra gasoline.

scraped clean of fat tissue and meat strips. The cleaning is done with scrapers made from moose shin bones or with dull knives. Cleaned pelts are allowed to dry for two or three days, and the pelts are wiped occasionally to remove excess grease. When the finished pelts are removed from their stretcher, they are strung on lengths of snare wire and/or are stored in waterproof garbage bags.

When muskrat meat is to be used for human consumption the muskrat carcass is viscerated and washed in cold water. The tail and head are removed and the animal is split down the backbone to produce a flat-lying carcass suitable for smoking and drying. The carcasses are placed on a rack above a smudge fire of rotten willow or poplar. The meat is smoked and dried in the sun for two or three days. When dry the meat has lost fifty percent of its weight and is then stacked in cardboard boxes for use later. For human consumption, the dried meat is soaked and then boiled.

Animals set aside for dog food, are rarely smoked or dried. Carcasses and intestines are fed fresh or are hung up to dry in a similar fashion as hang fish are.

In addition to the animals trapped at the baited or unbaited trap sites, greater numbers of animals are taken by shooting. A small caliber rifle such as a .22 caliber, loaded with 'shorts' [1] is used to shoot muskrats when they are spotted swimming or feeding. Once shot, usually in the head, the animal will float on the surface. Male muskrats are easily harvested during the breeding season. The animals can be called up to the ratting canoe by making a squeaking sound with the tongue and teeth. When the animal is shot at such short range, this allows a cleaner kill to be made and fewer wounded animals to be lost. The small ratting canoes, three to four meters long (10-14 feet), allow the trapper to follow the shallow channels and portage into the small lakes on the larger islands (Figure 4.3). The late evening and early mornings are the best hunting times and if traps are used at the same time, the trapper can shoot rats while he checks his traps. Mid-day is occupied resting and preparing the pelts.

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[1] The .22 short rifle caliber bullets used have a smaller grain bullet, use less powder and travel at a slower velocity, resulting in less damage to the pelts.

Calling of muskrats only works in the spring during the breeding season. In the fall the animals taken in open water are shot at a longer range and losses of wounded animals are greater.

The main channels such as Nagle, Steamboat and ResDelta are heavily travelled by hunters in the spring and fall and consequently, the animals become scarce and wary. Law (1950) expressed the fear that the main transportation channels were being overharvested especially in the open water seasons when a 'large shooting match' occurs.

Muskrats are trapped during the late fall and winter also. Once ice has become established on the small abandoned channels, lakes and bays, the muskrats begin to build winter houses out of equisetum and feeding pushups from subaquatic vegetation (Lemna spp., Potamogeton spp.) (Plate 4.8). Native trappers determine if the structures are occupied by probing the structures with a 'rat spear'. [20] If the trapper is able to detect an open plunge hole in an occupied house or pushup, a single trap is set in the structure. Houses are rarely trapped but the pushups are heavily trapped in the early winter and early spring. A number 1 1/2 or weighted number 1 trap is placed on the feeding platform inside the structure and then the cap of the pushup is replaced (Figure 4.4). The trap is attached to a willow or alder branch which prevents the trap being lost when the trapped animal dives back down the plunge hole. The weight of the trap prevents the animal from returning to the surface and it is drowned.

The pushups must be completely covered by snow to prevent light entering the structure and scaring off the feeding animals and to prevent the plunge hole from freezing over between feeding periods. Once trapping has removed the desired number of animals the traps are pulled and placed elsewhere. The failure of inexperienced trappers or those in a hurry, to reconstruct the pushup after trapping has been blamed for the freezing out of muskrat populations (Hunters' and Trappers' Association minutes April 1975).

Winter trapping for muskrats usually occurs during late January to break-up. The earlier part of the trapping season is reserved for the more valuable fur-bearers such as foxes, lynx and mink. Few trappers use

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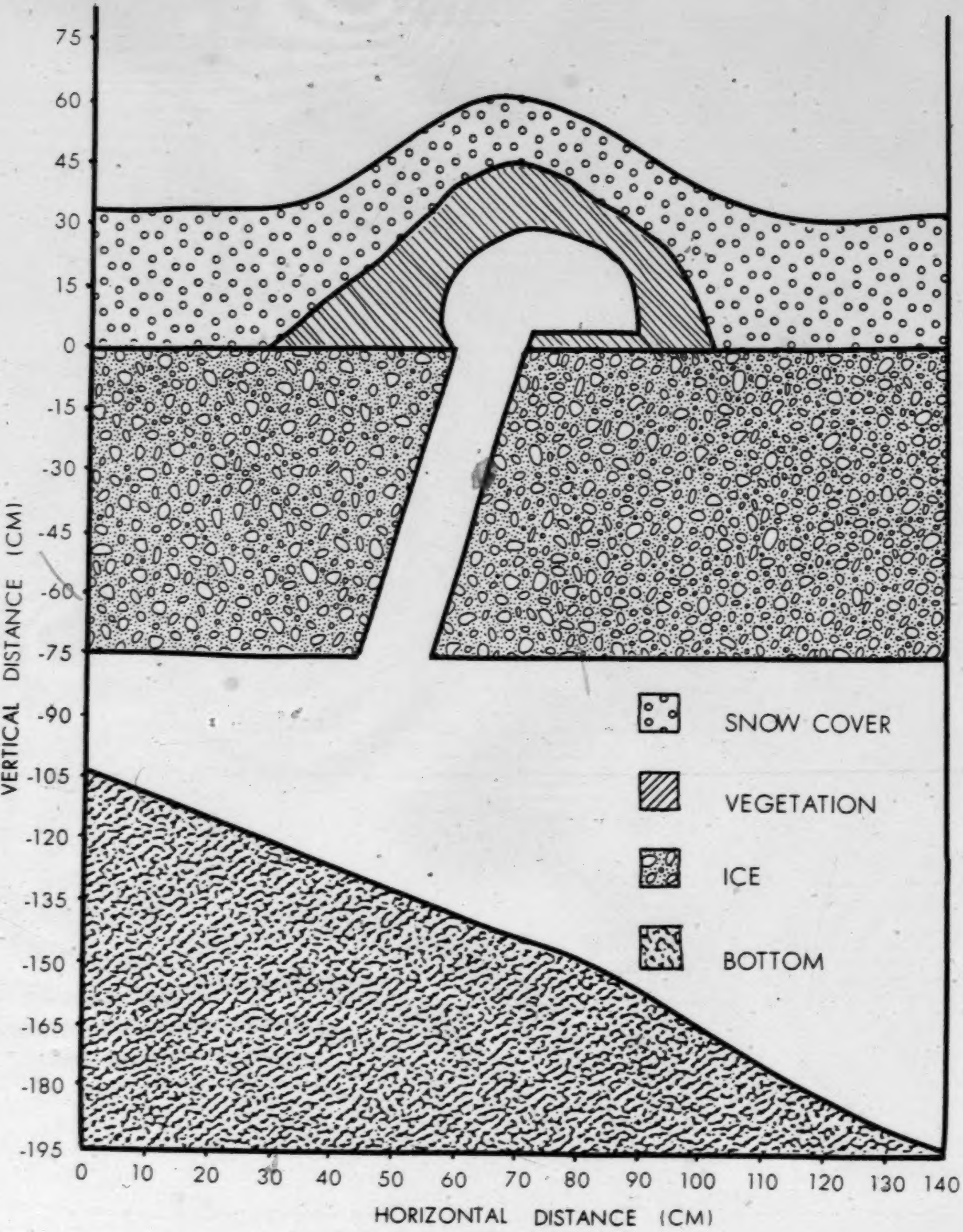
[20] Rat spears are straight metal bars of a small diameter, one to two meters long, with a wooden handle. The metal probe is pushed into the frozen vegetation of the muskrat houses or pushups. The spears are not used to kill the muskrats but are used to determine if the structure is inhabited. If the point fails to penetrate below the surface of the ice the structure is assumed to be inactive and frozen over. Water on the spear point indicates that the plunge hole is being kept open by animals moving through the the hole to the feeding and breathing platform.

FIGURE 4.4

MUSKRAT PUSHUP


75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
-105
-120
-135
-150
-165
-180
-195
VERTICAL DISTANCE (CM)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
HORIZONTAL DISTANCE (CM)
SNOW COVER
VEGETATION
ICE
BOTTOM

the delta early in the trapping season but the numbers that do so increases as spring approaches because traplines farther from town are abandoned as a consequence of the poor quality of long hair furs late in the trapping season and the necessity to travel before break-up.

4.5.2 Snowshoe Hares

Snowshoe hares are the second most abundant game animal harvested from the delta ('rabbit' locally). The annual harvest of hares is extremely variable as the population is subject to seven to ten-year cycles. The hare population started to increase noticeably in 1973 and by the time of the study it was extremely high. [21]

Hares are taken by snares or are shot. Shooting of hares occurs at the times of year when their fur colouration differs from their surrounding habitat. In the spring the white hares are visible against the bare ground, or just after the first fall snowfall when their dark colour contrasts with the white background.

However, most of the animals are caught with copper or brass wire snares. Once 'rabbit' trails are located in the dense understory of the islands or in the snow, snares are set where the path is narrow enough so that the hares have to run into the loop (Plate 4.9). A single hunter/trapper may keep up to ten snare lines, consisting of several hundred snares, throughout the delta. These lines are checked every day or two depending on weather conditions or on other activities. If the

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[21] The large number of animals harvested does not accurately reflect their local importance. Hares are of a lesser importance than muskrats or moose. They do not have any value as a fur bearer and the amount and quality of the meat and prestige generated by a kill is less than that for a moose.

4.9 Snowshoe hare snared in cooper snare along trail in the spruce assemblages along Nagle Channel.

lines are left much longer the dead animals become infested with fly maggots or are eaten by foxes, lynx, owls or ravens. Once a line is discovered by ravens, it has to be checked more frequently or abandoned.

The hares are skinned and cleaned once the trappers have returned to base camp or Fort Resolution. Animals taken to the field camps are kept frozen in the winter and thawed when they are to be used. The warm weather in the summer means that the hares must be cleaned quickly and smoked in a similar fashion as fish or muskrats. The hares taken back to town are kept in the community freezer, home freezers, or are given away or sold for a dollar each. In the summer of 1977 rabbits represented the sole source of fresh country food coming into the community and they were in great demand. The drastic drop in the muskrat population and the fear of disease (tularemia) meant little muskrat meat was preserved.

4.5.3 Squirrels

Squirrels are not actively pursued by serious trappers but are often taken in sets by accident. The value of the pelt can be severely reduced if the animals are caught in large mammal traps (numbers 1 1/2 and 2). A number of pelts are secured by children who shoot them near the fish and rat camps. Other squirrels are killed when caught in rabbit snares. The majority of the squirrels caught in the delta are near the coniferous assemblages or near the southwest and northeast boundaries of the study area.

Squirrel flesh is not used for human consumption except for that prepared by the children. Most of the meat and entrails are fed to the camp dogs or is discarded into the river.

4.5.4 Weasels

Weasels are harvested in the same manner as are squirrels. Most of the animals are caught by young trappers or by accident in mink sets. The pelts prepared from animals caught accidentally are invariably damaged by the large steel traps, reducing their market value. Carcasses are destroyed in campfires or are thrown in the river so that the camp dogs cannot eat them. The natives believe that if a dog eats the flesh of a member of the weasel family it will get sick and may die.

4.5.5 Mink

Mink are actively trapped throughout the delta once the season starts on November 1. The animals are taken with number 1 1/2 traps. The 'cubby set' is the most common set, consisting of a cubby or enclosed pen of wood built out from a tree or stream bank, allowing for entrance from the front (Plate 4.12). A bait stick is placed in the back of the set and a trap placed at the entrance. Trap placement appears to be more important than concealing the trap. No attempt is made to hide the bare metal of the trap, or to mask the scent of the trapper in handling the trap. As long as the trap is placed on a mat of grass at the narrow entrance of the cubby, the set is considered adequate. Traps are also set at the entrance to bank burrows, holes in beaver or muskrat lodges and entrances to 'hang ice' habitat.[22]

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[22] Hang ice habitats are formed along the edge of ice covered rivers or streams. When the ice cover forms in the early winter, water levels are slowly dropping. Ice along the shore freezes to the bottom to form land fast ice. When a solid cover of ice has formed and water levels continue to drop the ice sags toward the middle of the channel and breaks near the edge of the land fast ice. The ice covered air space between the old shore ice and the new-forming shore ice at the new water level is referred to as 'hang ice habitat'. This area is free from snow and the sub-aquatic and emergent vegetation is exposed. These areas are prime

[22] The trap is toggled to a drag stick to prevent the trapped animal from escaping. The drag and the wood used to construct the cubby should be dead so it will not attract snowshoe hares which can ruin the set.

Mink trapping is economically worthwhile until the second major fur sale of the year, usually in mid-January. After this sale mink prices traditionally drop. The value of the male mink pelt is normally much higher than that of female mink, but by the end of January both pelt values are similar, as low as five dollars a pelt. Animals taken in the spring are refrigerated for the following trapping season whenever possible. Much more effort is required to prepare a mink pelt as compared to a muskrat pelt. All the fat has to be removed and the cased pelt must be turned when dry so that the fur is on the outside.

4.5.6 Beaver

Beaver are taken by trapping and shooting in the Slave River Delta. The majority are shot with .22 or 30-30 calibre rifles during the open water trapping season. The animals are shot while swimming or when they are feeding. A wounded beaver is usually lost and even if it is killed quickly in the water it may sink. Bullet holes and the resulting blood stain reduce the value of the pelt (Flook 1954). The animals are often scarred and cut from fighting among themselves early in the spring and are not considered prime.

In the middle of the winter, beaver pelts are in prime condition and do not have many scars or cuts. Despite the higher market value of the pelt trapped or snared under the ice, few animals are taken in this manner. Trapping beaver under the ice is cold, hard work. Once the trails from the houses or bank burrows to the feed piles are located, leg hold traps (numbers 2 or 3) or snares are set along the trail near the lodge or bank burrow. Animals are attracted by a green poplar bait stick and, when caught, they drown quickly (Plate 4.10). Other sets include traps set on trails leading to freshly cut feed such as poplar and at the river bank where the animals haul themselves out of the water. These sets also use a 'drown set'; the trap is attached with a locking swivel to a wire extending to water deep enough to drown the animal.

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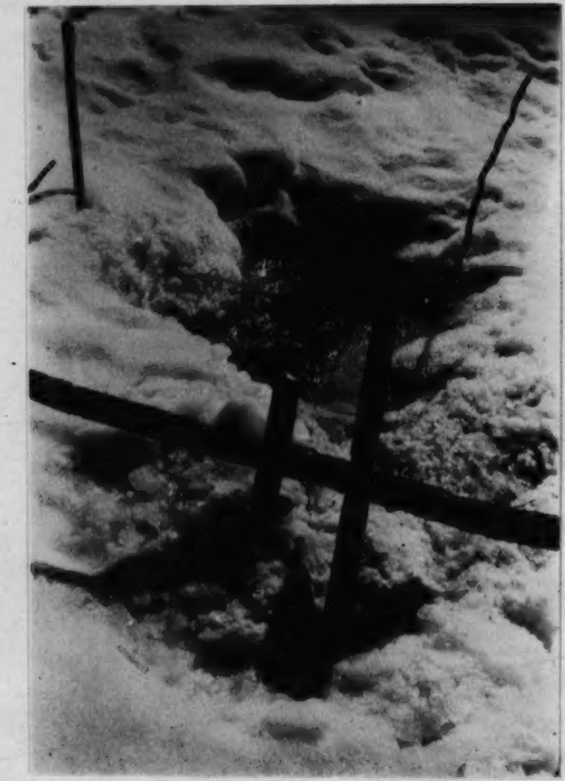
[22] (cont'd)winter feeding areas and are safe from most land and avian predators. Mink often use these areas for winter travel and for hunting muskrats that are attracted to the exposed vegetation.

The trapping season is from October 15 to May 10 but beaver are taken outside the season. Animals are harvested because of the rich, dark meat. The meat is boiled to produce a stock to which rice or potatoes are usually added. All of the animal is used except for the entrails. The tail and feet are boiled and eaten also. Beaver tail is considered by many to be the best part of the carcass. The meat is not preserved but eaten fresh. Scent glands or castor are used as bait for lynx and foxes or are dried and sold along with the pelt.

4.5.7 Fox

The only long hair fur-bearers consistently harvested in the study area, are fox. Three colour phases of the common or coloured fox (Vulpes fulva) are found in the delta; red fox, cross fox and silver fox. Arctic fox (Alopex lagopus) are also found in the delta. The red fox and the cross fox are the most common. For the purpose of the study all the



4.10 Underwater beaver set with poplar bait stick. Trap is placed on the 1 x 6 plank below the bait. Poplar twigs frozen into the ice indicate the location of feed pile.

above are aggregated. The trapping season opens on November 1.and extends to February 28.

Traps are set on muskrat houses in the bays of the outer delta (Figure 4.5), because the foxes are attracted to the houses by the muskrats and resident microtine population. A slight hollow is scraped out of the top or side of the house and a number 1 1/2 leg hold trap is placed in the depression. The trap is covered with loose snow and usually left unbaited. Occasionally, scraps of fish or muskrat flesh are left by the trapper around the house. The trap is toggled to a short chain anchored to a stake driven into the vegetation mound (Plate 4.11). Other traps are set on the main channels, along the snowmobile trails, near prominent snags or deadheads extending through the river ice. No care is taken to prevent the trap from freezing open or to remove human scent. Fox meat is often thrown away although the older trappers will eat it.

4.5.8 Marten

All of the marten harvested in the study area are trapped in or near the white spruce assemblages along Nagle, Little Fishery and Little Jean channels. The sets are constructed in the same manner as the mink sets but are located away from the water bodies. Traps are occasionally set on poles leaning against larger trees with the toggle and chain shortened to prevent the trapped animal from reaching the ground.

Marten appear to be fairly recent arrivals in the delta. Local trappers have only considered it worthwhile to scout for their tracks and trails in the past four or five years.

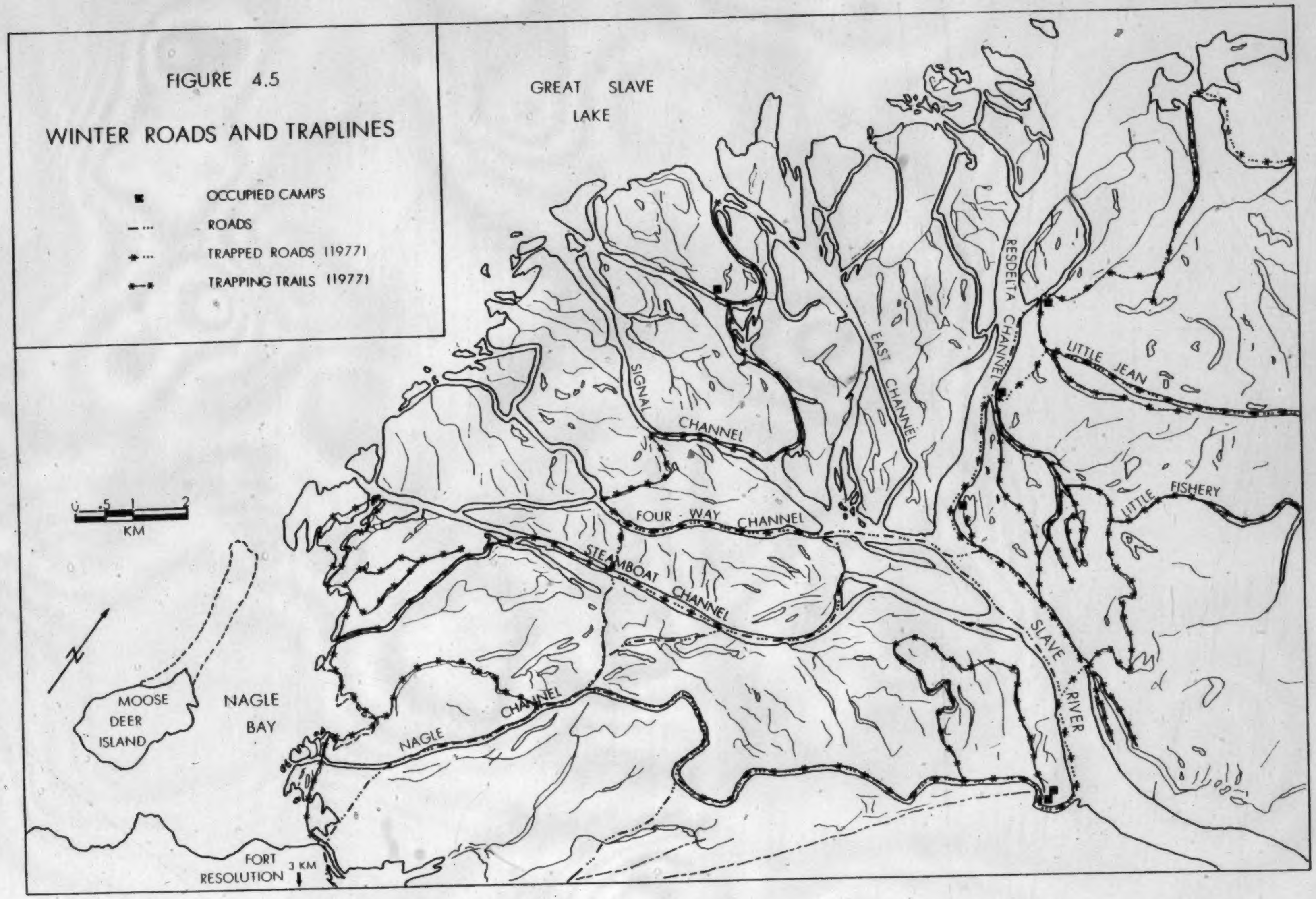
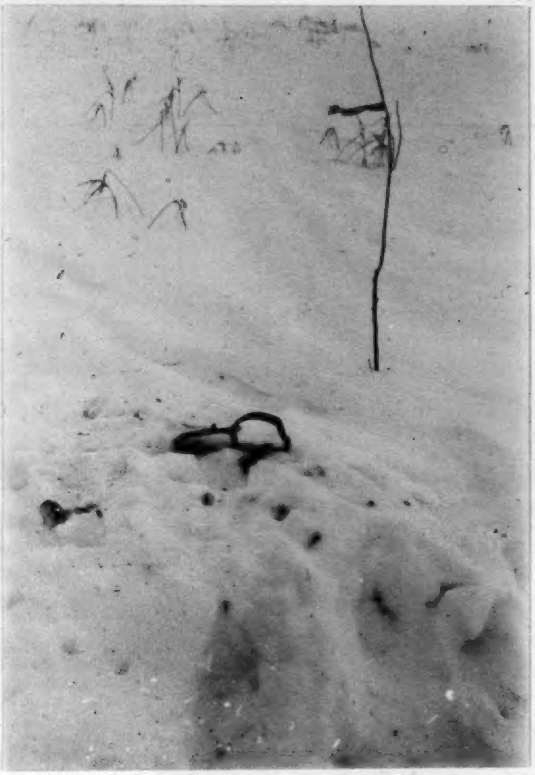


FIGURE 4.5

WINTER ROADS AND TRAPLINES

■ OCCUPIED CAMPS
ROADS
TRAPPED ROADS (1977)
TRAPPING TRAILS (1977)
0 .5 1 2
KM
GREAT SLAVE LAKE
SIGNAL CHANNEL
EAST CHANNEL
RESDELTA CHANNEL
LITTLE JEAN
LITTLE FISHERY
FOUR - WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
NAGLE BAY
MOOSE DEER ISLAND
FORT RESOLUTION 3 KM



4.11 Fox set with the trap toggled in a slight depression on the muskrat house. Willow branch with flagging tape indicates a trapped house and the owner of the trap and trapline.

4.5.9 Fisher

Fisher can be considered accidental or occasional visitors to the delta, having a larger range than do the marten. Ross (1861) recorded the species being trapped in the willow-alder communities near the outer delta. Local trappers take one or two animals occasionally, usually in traps set for foxes, mink or marten.

Fisher and marten flesh is rarely used for human consumption except by the older trappers during times when camp meat is scarce. The meat is boiled and prepared in a fashion similar to most of the country food. The meat is fed most often to the camp dogs or discarded.

4.5.10 Lynx

The most individually valuable fur-bearer trapped in the study area is the lynx. Lynx are rare in the study area despite a large snowshoe hare population. The high level of human activity in the southern half of the delta is thought to keep the animals away from the area. 'Cubby sets' similar to those used for mink and marten are built along Little Jean and Little Fishery channels and in the white spruce areas in the northeast border. The sets are baited with a red flag and a piece of fur dipped in a mixture of lynx intestines, urine and shaving lotion (Plate 4.12).

The meat is highly prized, at times referred to as 'turkey'. It is light coloured meat and resembles the flesh of snowshoe hares and is prepared in the same manner. Once cut up the flesh is boiled in a stock pot or fried in lard. The tougher cuts and carcass are fed to the dogs while the scent glands and intestines are saved for bait.

4.12 'Cubby set' built against a tree along Nagle Channel. Trap is set at the narrow entrance and left uncovered. Bait is set at the base of the trunk.

4.5.11 Problems and Programs

Trapping in the Slave River Delta is concentrated in a three to four week period twice a year, when the muskrats can be taken by trapping and shooting. During the rest of the trapping season, only ten to twelve out of approximately a hundred and fifty trappers actively use the study area. Throughout the busy periods though, everyone in town who has the time, attempts to take a few muskrats, the 'bread and butter' of the trapping industry. Local industries, such as the sawmill and government offices, allow their employees to take their holidays during these times. In the case of the sawmill the operation is shut down because in the spring the ground is too soft to haul logs from the logging areas and in the fall, the mill has exhausted its year's stockpile and is waiting for enough snow to build haul roads. Unemployed workers participate in the spring and fall hunts. On weekends during the 'ratting' time, the delta is extremely crowded because those who have to work during the week, spend all their free time shooting or trapping muskrats.

Few people stay out in the delta for more than a month at a time and the number that do is diminishing. During the winter of 1976-77, only three household units comprising eleven individuals spent a good portion of the winter in the delta (Figure 4.5). The government offers financial assistance to the local trappers to encourage them to build permanent structures and upgrade trap lines in resource areas, which would allow them to harvest the area's resources more effectively but because of the closeness of the delta to the settlement there is little incentive for the people to construct more permanent bush camps.

The territorial government offers marketing programs to encourage trapping, including the sale of furs to Fish and Wildlife officers and a fur rebate of fifteen percent. The Fish and Wildlife officer ships the trapper's furs to the Edmonton Fur Auction and pays the trapper the bulk of the current market value. If the furs fetch a higher price than already received, the trapper receives the extra or he returns the extra if the sale price is less. The program provides the native with cash for his furs faster than if he sent them to market himself and he still receives the higher auction price.

The fur rebate is designed to encourage trappers to put more effort into trapping by rewarding them for success. Above a base fur income of five hundred dollars the trapper is entitled to fifteen percent of his sales not exceeding three thousand dollars. The maximum amount of rebate is four Hundred and fifty dollars. This program results in the successful trapper selling his furs under another General Hunting License number to maximize his return. It has not discouraged the weekend trapper in the study area because he can sell his furs with another trapper's furs so that the minimum level needed to receive the rebate is realized and both benefit.

The open and easy access to the fur resource of the delta creates problems of overcrowding. The ideal base camp locations are usually occupied by the same families year after year so the weekend or holiday trapper/hunter is forced to locate in areas which may not be as productive. The large number of people using the main transportation channels of the delta, reduces the resources of these areas. In the case of Nagle, Steamboat, and ResDelta channels, the muskrat population is virtually eliminated temporarily. These three areas are also the best overwintering areas in the delta, with the result that few animals are allowed to remain in the areas where they stand the best chance to survive the winter and reproduce.

Other problems associated with the overcrowded conditions include the increased incidence of animals and/or traps being stolen, sets being destroyed and the animals becoming extremely wary. Motor boats passing through the small distributary channels send waves over floating sets and set off traps or tip the traps into the water. The frequency of boat traffic (motor boat and canoe) allows little time for the traps to be visited by the feeding animals. The muskrats have begun to restrict their feeding to the hours of darkness.

4.6 Logging

4.6.1 Present Conditions

Logging and the associated lumbering industry was not included in the discussion on gathering activities because of the small scale of the operation and it is not considered a traditional activity.

Edaphic climax white spruce occupy the highest and least flooded sections of the delta, particularly in the east-southeast corner of the delta and along the old stranded channels of Little Fishery and Little Jean River in the northeast section of the delta (Figure 4.6). These white spruce assemblages have been logged in the past, producing lumber to build the Roman Catholic mission or private ventures (Plate 4.13).

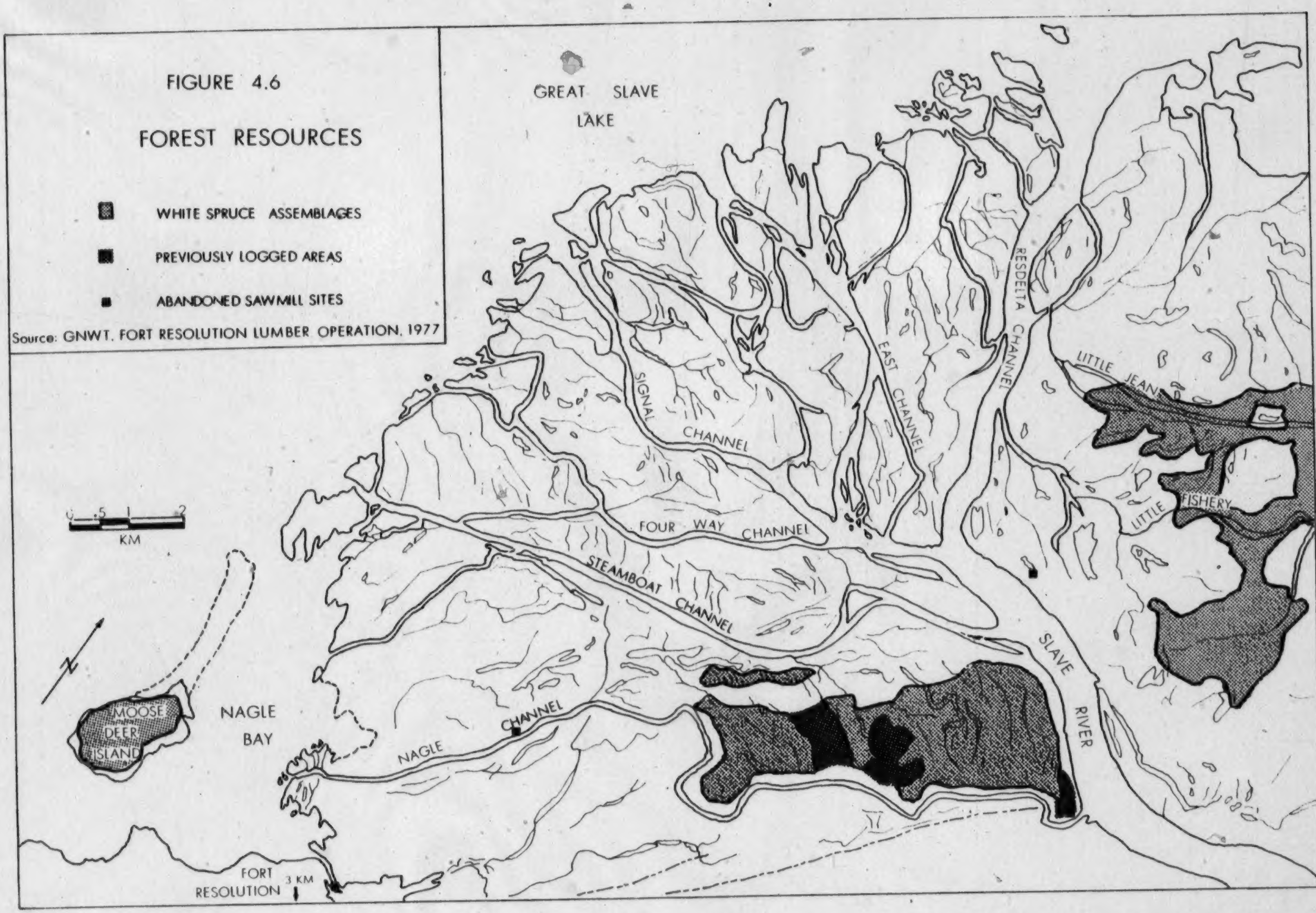
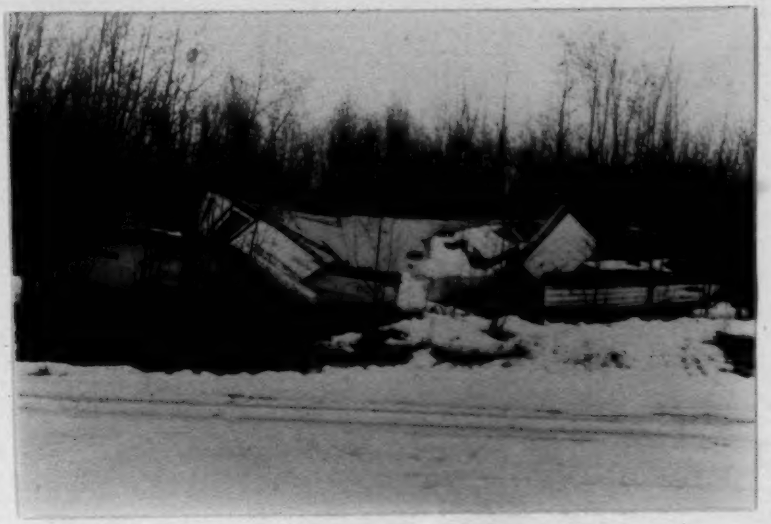


FIGURE 4.6

FOREST RESOURCES

WHITE SPRUCE ASSEMBLAGES
PREVIOUSLY LOGGED AREAS
ABANDONED SAWMILL SITES
GREAT SLAVE LAKE
SIGNAL CHANNEL
EAST CHANNEL
RESDELTA CHANNEL
LITTLE JEAN
LITTLE FISHERY
FOUR WAY CHANNEL
STEAMBOAT CHANNEL
SLAVE RIVER
NAGLE CHANNEL
NAGLE BAY
MOOSE DEER ISLAND
FORT RESOLUTION 3 KM
0 .5 1 2
KM

Source: GNWT, FORT RESOLUTION LUMBER OPERATION, 1977



4.13 Derelict river schooner at the abandoned Roman Catholic Mission Sawmill. Successional growth has encroached on the abandoned site on Nagle Channel.

4.14 Abandoned headrig from the Nahanni Sawmill at the apex of Nagle Channel and the Slave River. Young poplar growth in the foreground.

Four mills have located in the study area since the 1940's and the last mill site, Nahanni Lumber, at the apex of the delta where Nagle Channel leaves the Slave River, was abandoned in 1970 (Plate 4.14). These mills have traditionally employed native labourers but native ownership has been restricted to the mill presently operating in Fort Resolution.

During the duration of the study, no logging activity took place. The last logging to occur in the delta was in 1970, when the forested areas along Nagle Channel were logged and taken to the Nahanni Sawmill for milling, producing 1.756 thousand feet board measure (MFBM) (Nahanni Lumber 1971) (Figure 4.6). The existing reserves of the delta are not sufficient to support the Slave River sawmill in Fort Resolution. They will probably not be harvested in the near future because of the transportation problem caused by having to cross the Slave River during the winter. The existing cleared haul roads currently used for the sawmill's logging operation, follow the bank of the main Slave River. Crossing the river in the delta is dangerous for sleighs or snowmobiles and the danger would be greater for large hauling equipment.

An awareness of the importance of the fur resources of the delta and their relationship with their habitat would also reduce the probability of logging in the area.

It is also noted that the Slave River Sawmill in Fort Resolution has developed a resource inventory along the banks of the Slave River and is committed to logging the three thousand board feet required for its' annual operation from the forest resources south of the delta (Schultz 1970, GNWT 1977b, Lagomidiere 1978).

DATA ANALYSIS

5.1 Introduction

Income in Fort Resolution is based on three main sources: welfare or social assistance; hunting, trapping and fishing; and wage employment. This thesis attempted to collect as complete a picture as possible of the country food components of the native economy of Fort Resolution. The importance of subsistence hunting has not been recognized in conventional assessments of local economies and previous analyses of the Fort Resolution economy have not included this important part of the community structure.

5.2 Local Substitution Values

Imputed values for country food by substitution are used in this study to provide a measure of this resource. Values assigned differ according to the final use of the country food.

Fort Resolution contains approximately 440 dogs which must be fed every second day in the summer and daily in the winter (RCMP 1977). This number is not constant throughout the year but is highest in the summer. If fresh or dried meat is not available for the dogs, owners must purchase the only available substitute, dried dog meal. The cost of a 20 lb. bag in 1977 was $6.50, or $0.65 per kilogram. This value has been used to calculate the dollar value of country food used for dog food.

Few cuts of beef or pork are available in the frozen food sections of the two retail outlets in Fort Resolution. In June 1977, both stores offered chuck steaks ($1.85 per lb.), hamburger patties ($1.80 per lb.) and pork chops ($2.30 per lb.). Pork is not purchased as often as beef, so the lower price for beef ($4.00 per kilogram) is used in this study. The $4.00 substitution value is used for all red meat products. The imputed cash value of the delta's production was based on the minimum values for locally available retail meat.

Frozen chicken in Fort Resolution sold for $1.25 per pound or $2.75 per kilogram in June 1977. This value is used for all fowl produced in the delta.

Fish products used for human consumption have no locally available substitute. Fish is not sold through retail outlets except in a processed form. Freshwater fishermen receive between thirty-five and fourty cents per pound for whitefish from the processing and packing plant in Hay River. Fish are usually flown to the Hay river plant directly from the netting areas. This summer price ($0.83 per kilogram) is used for all fish products including the species which have a lower commercial value such as maria, pike and cony. The lower commercial value is attributed to a low consumer acceptance but these species are highly prized locally.

Berry production is calculated with a substitution value of $2.50 per kilogram. Local substitutes are rare and are usually frozen blueberries.

Protein values of country food differ slightly from beef products (Table 3.1). This study recognizes this difference but does not make an economic adjustment for it by attempting to establish an arbitrary weighting scale. Meat is consumed by quantity not by quality, although there is an expressed preference for country food. Consumption levels remain the same despite the type of food being eaten.

5.3 Country Food Values From Survey Data

The 1975-76 harvest season (July-June) generated $129,162.59 worth of country food. Table 5.1 shows the value of country food used for human consumption. Table 5.2 shows the value of country food allotted for animal consumption. The major part of the total human food value of $111,729.51 is provided by muskrats ($44,062.00), moose ($25,113.60), snowshoe hares ($16,424.84) and ducks ($8,130.93). Of the $17,433.08 generated for animal consumption, muskrats account for most of this total, $10,740.11. The next types of food in importance are all fish, maria ($2,978.61), longnose suckers ($967.00), whitefish ($579.63), cony ($575.09) and northern pike ($568.50). [23]

When combined with the value of the fur resources taken from the study area, the total value of production from the delta is an estimated $222,367.74 (Table 5.3).

The 1976-77 harvest season (July-June) generated a slightly lower total country food production figure than the previous year

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[23] The ranking of each species given indicates a local significance in terms of dollar value based on quantities consumed which may differ from their actual perceived significance as indicated in Section 4.

TABLE 5.1

IMPUTED VALUE OF COUNTRY FOOD USED FOR HUMAN CONSUMPTION

	1976(A) TOTAL WEIGHT KILO	1977(B) TOTAL WEIGHT KILO	SUBSTITUTION VALUE $/KILO	TOTAL REVENUE A	TOTAL REVENUE B
Beaver	661.67	392.64	4.00	2,646.69	1,570.55
Muskrat	11,015.50	8,371.73	4.00	44,062.00	33,486.90
Mink	5.60	7.65	4.00	22.40	30.60
Marten	.27	.34	4.00	1.08	1.36
Fisher	.39	.39	4.00	1.56	1.56
Lynx	.0	10.68	4.00	.00	42.72
Squirrel	6.80	10.01	4.00	27.20	40.04
Weasel	.0	.0	4.00	.00	.00
Fox	9.53	9.53	4.00	38.12	38.12
Rabbit	4,106.21	6,482.92	4.00	16,424.84	25,931.68
Ptarmigan	1,039.9	1,426.3	2.75	2,859.73	3,922.33
Grouse	173.5	138.2	2.75	477.13	380.05
Ducks	2,956.7	3,137.3	2.75	8,130.93	8,627.58
Geese	977.5	783.9	2.75	2,688.13	2,155.73
Moose	6,278.4	1,852.3	4.00	25,113.60	7,409.20
Bear	1,277.2	772.3	4.00	5,108.80	3,089.20
Whitefish	891.75	1,087.5	.83	740.15	903.63
Maria	1,963.92	2,587.2	.83	1,630.05	2,147.38
Northern Pike	583.08	749.72	.83	483.96	622.27
Cony	589.84	1,233.96	.83	489.56	1,024.18
Suckers	165.3	152.2	.83	137.20	126.33
Walleye	0.0	107.1	.83	.00	88.89
Berries	285.55	184.6	2.50	646.38	461.53
				11,729.51	92,101.83

TABLE 5.2

IMPUTED VALUE OF COUNTRY FOOD USED FOR ANIMAL CONSUMPTION

	1976(A) TOTAL WEIGHT KILO	1977(B) TOTAL WEIGHT KILO	SUBSTITUTION VALUE $/KILO	TOTAL REVENUE A	TOTAL REVENUE B
Beaver	73.52	43.63	.65	47.79	28.34
Muskrat	16,523.24	12,557.59	.65	10,740.11	8,162.43
Mink	51.26	6.88	.65	33.32	4.47
Marten	2.04	3.05	.65	1.37	1.98
Fisher	3.57	3.57	.65	2.32	2.32
Lynx	0	0	.65	.00	.00
Squirrel	61.15	90.09	.65	39.75	58.56
Weasel	0	0	.65	.00	.00
Fox	9.53	9.53	.65	6.19	6.19
Rabbit	256.24	720.32	.65	296.55	468.21
Ptarmigan	445.7	611.3	.65	289.70	397.35
Grouse	19.3	15.4	.65	12.45	10.01
Ducks	0	0	.65	.00	.00
Geese	0	0	.65	.00	.00
Moose	0	0	.65	.00	.00
Bear	425.7	257.4	.65	276.70	167.31
Whitefish	891.75	1,087.5	.65	597.63	706.88
Maria	4,582.48	6,036.8	.65	2,978.61	3,923.92
Northern Pike	874.62	1,124.55	.65	568.50	730.94
Cony	884.76	1,850.94	.65	575.09	1,203.11
Suckers	1,487.7	1,370.25	.65	967.00	890.66
Walleye	0	0	.65	.00	.00
				17,433.08	16,762.68

TABLE 5.3

TOTAL REVENUE 1975-76

ITEM	IMPUTED VALUE HUMAN	ANIMAL	TOTAL	FUR VALUE #	AV PELT VALUE	TOTAL
Beaver	$ 2,646.68	$ 47.79	$ 2,694.47	91	$ 14.10	$ 1,283.10
Muskrat	44,062.00	10,740.11	54,802.11	37,366	2.39	89,304.74
Mink	22.40	33.32	55.72	67	26.06	1,746.02
Marten	1.08	1.37	2.45	4	13.80	55.20
Fisher	1.56	2.32	3.88	2	80.00	160.00
Lynx	.00	.00	0.00	0	122.18	0.00
Squirrel	27.20	39.75	66.95	150	.50	75.00
Weasel	.00	.00	0.00	122	.72	87.84
Fox	38.12	6.19	44.31	7	48.75	341.25
Rabbit	16,424.84	296.55	16,721.39	4473	NA	0.00
Ptarmigan	2,859.73	289.70	3,149.43	--	--	--
Grouse	477.13	12.45	489.58	--	--	--
Ducks	8,130.93	.00	8,130.93	--	--	--
Geese	2,688.13	.00	2,688.13	--	--	--
Moose	25,113.60	.00	25,113.60	--	--	--
Bear	5,108.80	276.70	5,385.50	23	50	1,150.00
Whitefish	740.15	706.88	1,447.03	--	--	--
Maria	1,630.05	3,923.92	5,553.97	--	--	--
Northern Pike	483.96	730.94	1,214.90	--	--	--
Cony	489.56	1,203.11	1,692.67	--	--	--
Suckers	137.20	890.66	1,027.86	--	--	--
Walleye	.00	.00	0.00	--	--	--
Berries	646.38	.00	646.38	--	--	--
	$111,729.51	$17,433.08	$129,162.59			$93,205.15
						$222,367.74

($108,664.51). Table 5.1 provides details on the country food used for human consumption and Table 5.2 on that used for dog food. Food used for human consumption ($92,101.83) consists of muskrats ($33,486.90) and snowshoe hares ($25,931.68), ducks ($8,627.58), moose ($7,409.20) and ptarmigan ($3,992.33). Activities producing food for animals were worth $16,762.68. Muskrats ($8,162.43) were the main source of dog food with fish products being important; ie. maria ($3,923.92), cony ($1,203.11), longnose suckers ($890.66), northern pike ($730.94) and whitefish ($706.88). The cash value of the fur ($83,949.57) harvested is less than the value of the food for human and dog consumption produced by similar activities. Total food and fur production from the delta in 1976-77 was an estimated $192,814.08 (Table 5.4).

Interviews were conducted by household units. The figures in Tables 4.1, 4.2, 4.3, 4.4 are the result of a census of 102 of the 103 household units in Fort Resolution, representing 162 males between 14 and 70 years. The total value of country food and furs taken in 1975-76, $222,367.74, represented an average gross income of $2,180.07 per household. The 1976-77 fur and food total of $192,814.08 provided an average gross income of $1,890.33. These figures do not accurately represent the individual hunters and trappers who pursue subsistence activities on a more or less full-time basis.

The economic worth of animals harvested is offset by the costs of production such as by cash outlays for equipment and supplies (Table 5.5). The list compiled represents a complete inventory of equipment necessary to participate in modern 'traditional' subsistence activities. All the costs are new purchase costs, except for the freighter canoe

TABLE 5.4

TOTAL REVENUE 1976-77

ITEM	IMPUTED VALUE HUMAN	ANIMAL	TOTAL	FUR VALUE #	AV PELT VALUE	TOTAL
Beaver	$ 1,570.55	$ 28.34	$ 1,598.89	54	$ 13.81	$ 745.74
Muskrat	33,486.90	8,162.43	41,649.33	28,398	2.76	78,378.48
Mink	30.60	4.47	35.07	90	31.02	2,791.80
Marten	1.36	1.98	3.34	6	21.85	131.10
Fisher	1.56	2.32	3.88	2	41.43	82.86
Lynx	42.72	.00	42.72	2	218.76	437.52
Squirrel	40.04	58.56	98.60	221	.62	137.02
Weasel	.00	.00	.00	175	.89	155.75
Fox	38.12	6.19	44.31	7	69.90	489.30
Rabbit	25,931.68	468.21	26,399.89	7,062	--	--
Ptarmigan	3,922.33	397.35	4,319.68	--	--	--
Grouse	380.05	10.01	390.06	--	--	--
Ducks	8,627.58	.00	8,627.58	--	--	--
Geese	2,155.73	.00	2,155.73	--	--	--
Moose	7,409.20	.00	7,409.20	--	--	--
Bear	3,089.20	167.31	3,256.94	12	50	600
Whitefish	902.63	706.88	1,609.51	--	--	--
Maria	2,147.38	3,923.92	6,071.30	--	--	--
Northern Pike	622.27	730.94	1,353.21	--	--	--
Cony	1,024.18	1,203.11	2,227.29	--	--	--
Suckers	126.33	890.66	1,016.99	--	--	--
Walleye	88.89	.00	88.89	--	--	--
Berries	461.53	.00	461.53	--	--	--
	$92,101.83	$16,762.68	$108,864.51			$83,949.57
						$192,814.08

TABLE 5.5

EQUIPMENT LIST

FOR SUBSISTENCE ACTIVITIES

ITEM	INITIAL COST	LIFE EXPECTANCY	$COST/YEAR
TENT	$ 80	4-5 yrs	16-20
STOVE PIPING	$ 25	2 yrs	12.50
FREIGHTER CANOE	$600	6 yrs	100.0
RATTING CANOE	$300	6 yrs	50.0
OUTBOARD MOTOR	$750	3 yrs	250.0
SLEIGH/CARIOLE	$ 60	3 yrs	20.0
SNOWMOBILE	$1000-1200	2-3 yrs	350.0-400.0
RIFLE (30-30)	$180	10-15 yrs	12-18
RIFLE (.22)	$ 60	8 yrs	7.50
SHOTGUN (16 or 12 gauge)	$ 40	10 yrs	4.0
CAMP OR SLEIGH DOGS (3)	$ 60	6 yrs	10.0
TRAPS (100) 1 1/2	$350	10 yrs	35.0
(10) 2	$ 60	10 yrs	6.0
SNARES (200) RABBIT	$ 16	1 yr	16.0
(15) LYNX/BEAVER	$ 10	1 yr	10.0
AXE	$ 15	5 yrs	3.0
SAW	$ 10	5 yrs	2.0
COOKING GEAR	$ 20	3 yrs	7.0
SLEEPING BAG	$100	4 yrs	25.0
STRETCHING BOARDS (100)	$ 10	4 yrs	2.50
LAMPS	$ 20	2 yrs	10.0
NETS	$ 40	1 yr	40.0
SHELLS (.22)	$ 60	1 yr	60.0
(12 gauge)	$ 35	1 yr	35.0
(30-30)	$ 25	1 yr	25.0
			$1,164.00

which is the cost of a used canoe in good shape and a good second hand twenty horsepower motor or 'kicker'. A great deal of equipment is traded, or sold below its 'true' value. Traps and rifles are often sold during drinking parties and an outfit can be obtained for less than the figures indicate. Assuming an estimated annual outfitting cost of $1,164.00, the net average household incomes generated by subsistence activities are $1,016.07 and $726.33 for 1975-76 and 1976-77 respectively. Subsistence activities are, therefore, economically profitable ventures for Fort Resolution residents. The figures given do not include the natural resources harvested outside the study area.

5.4 Other Income Sources

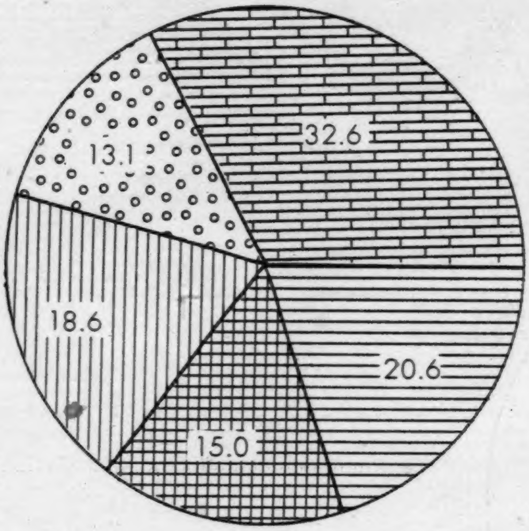
Lagimodiere (1978) has calculated the income from the three economic sources of Fort Resolution (Figure 5.1). In 1975-76 (July-June), approximately $81,269.62 was received as social assistance, either as welfare payments or clothing and food. Another $203,125.00 was earned through wage employment, mostly at the Slave River sawmill. It does not appear to include government employment. Fur sales were approximately $209,375.00. Of this total, $93,203.15 was obtained from the fur resources of the delta. Not included in the above income tabulation was the additional $129,162.59 in country food from the delta estimated by the present study. The inclusion of this money, emphasizes the importance of the delta to the community as well as stressing the significance of all subsistence activities. Country food and fur from the delta provides some 35.6 percent of the community's income.

FIGURE 5.1

COMMUNITY INCOME BY ECONOMIC SECTOR

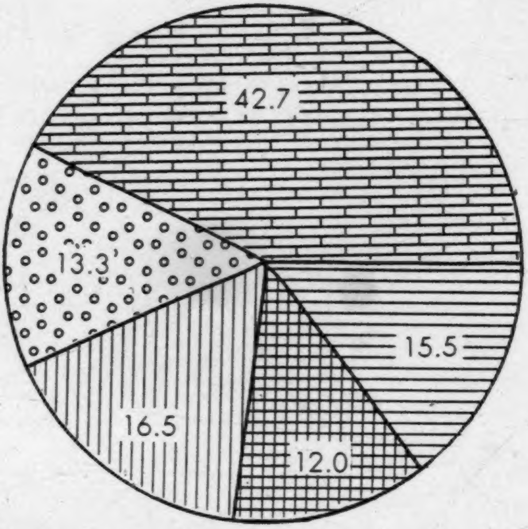
1975-76 ($622,932.21)

[1]Wage Employment	▤	$203,125.00
[2]Social Assistance	⁘	$ 81,269.62
[3]Fur Payments	▥	$209,375.00
[4]Slave Delta Furs	▦	$ 93,203.15
[4]Slave Delta Resources	☰	$222,367.74



1976-77 ($701,935.51)

[1]Wage Employment	▤	$300,000.00
[2]Social Assistance	⁘	$ 93,071.01
[3]Fur Payments	▥	$200,000.00
[4]Slave Delta Furs	▦	$ 83,949.57
[4]Slave Delta Resources	☰	$192,814.08



[1] Lagimodiere, R.G., An Evaluation of the Benefits and Costs of Continued Operation of Slave River Sawmill, Ltd., Fort Resolution, Northwest Territories; Dept. Regional Economic Development, Saskatoon, 1978.

[2] Government of Northwest Territories, Social Assistance Records, Fort Smith, 1977.

[3] Government of Northwest Territories, Fur Export Records, Fort Resolution, 1976, 1977.

[4] Interviews.

In 1976-77, welfare payments had increased to $93,071.01 and wage employment had increased to approximately $300,000.00. Fur sales for the Fort Resolution area remained about $200,000.00 with $83,949.57 coming from the fur resources of the delta. Not included was an additional $108,864.51 of country food from the study area which along with furs accounts for 27.5 percent of the total community income. Traditional activities still remained one of the two most important income generating sectors in the community economy.

Wage employment opportunities in Fort Resolution are restricted to Territorial government or community employment and the sawmill. Eighty-four positions were occupied by native people out of a possible one hundred and eight full-time positions, including thirty-eight at the sawmill (Lagimodiere 1978).

The sawmill is very important to the community, as a direct source of income and because of its relationship to the hunting/trapping/and fishing activities. The sawmill employs approximately one hundred men each year to fill thirty-eight jobs. It experiences a 'three hundred percent' turnover with sixty-six percent of the labour force working less than three months. The sawmill enables individuals to support families through wage and traditional pursuits, or through wage employment only. The identification of the role of the sawmill in the community structure is complicated by the fact that each wage earner-member of the community would like to fit the sawmill operation completely within his pursuits of hunting, fishing and trapping (Government NWT 1977).

"Mill and fur income rise and fall proportionately and conversely, social assistance falls and rises in retrospect of these two income generating enterprises" (Government NWT 1977b: 23). Hunting and trapping are much more effective and productive if the sawmill is in operation because the two economic ventures complement each other. Social assistance is also reduced when the sawmill is in operation (Table 5.6).

Standards which are applied in communities which derive their livelihood entirely from wage employment cannot and should not be applied to communities such as Fort Resolution which maintain a strong tie to subsistence activities. Housing and utilities in Fort Resolution are provided by the Northwest Territories Government and rent and utility rates are charged according to the occupant's wage earning status. If a hunter/trapper can provide a good portion of the household food from subsistence hunting activities and seldom works, he has to pay very little rent (Stiles 1972).[24]

Stiles (1972) found that the indigenous families of Fort Resolution had a mean annual income of $4,500.00. This figure did not include any attempt to include country food. Of this total, forty-eight percent was spent on food. This major expenditure can be reduced by the natives through hunting, trapping and fishing. Figure 5.2 shows the effect country food production has on meat and total food sales during and shortly after the spring and fall ratting seasons. The reliance on

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[24] The Cree of the James Bay area of Quebec have also maintained a close and active association with a subsistence lifestyle despite the opportunities for wage employment with the James Bay Hydro Project. LaRusic (1978: 38) found a situation similar to that commented on by Stiles (1972) where natives have "much more income at their disposal by directing only a small proportion of their time at wage employment and a larger proportion at food harvesting and nature following".

TABLE 5.6

SOCIAL ASSISTANCE

FORT RESOLUTION 1973-1977

	1973	1974	1975	1976	1977	
JANUARY		*24,365.00	12,665.76	7,200.70	7,450.32	27,316.78 (9105.60)
FEBRUARY		10,534.00	11,520.60	7,490.44	8,005.69	37,550.73 (9387.68)
MARCH		8,175.00	7,116.11	4,863.20	7,626.25	27,780.56 (6945.14)
APRIL	NA	19,784.00	4,563.22	6,615.55	6,778.01	37,740.78 (9435.20)
MAY	6,440.00	7,233.00	5,885.46	6,205.66	5,860.31	31,624.43 (6324.89)
JUNE	9,434.00	15,982.00	6,579.55	5,373.95	7,969.76	45,339.26 (9067.85)
JULY	15,801.00	9,501.00	7,197.00	9,865.68	7,814.77	50,179.45 (10,035.89)
AUGUST	10,785.00	13,731.20	6,703.09	9,863.50	8,084.96	49,167.75 (9833.55)
SEPTEMBER	10,414.00	16,032.05	7,510.79	9,157.15	13,821.83	56,935.82 (11,387.16)
OCTOBER	13,562.00	8,832.43	6,053.76	7,692.77	6,109.26	42,250.22 (8450.04)
NOVEMBER	11,292.00	7,878.56	7,266.11	5,453.08	5,106.86	36,996.61 (7399.32)
DECEMBER	*114.00	8,805.69	8,795.37	7,348.49	10,305.60	35,255.15 (8813.79)
	77,842.00	150,853.93	91,856.82	87,130.17	84,628.02	
	9,730.25	12,571.16	7,654.74	7,260.85	7,052.34	

* values confused: total for December & January = 24,479.00

Source: Social Services, GNWT, Fort Smith

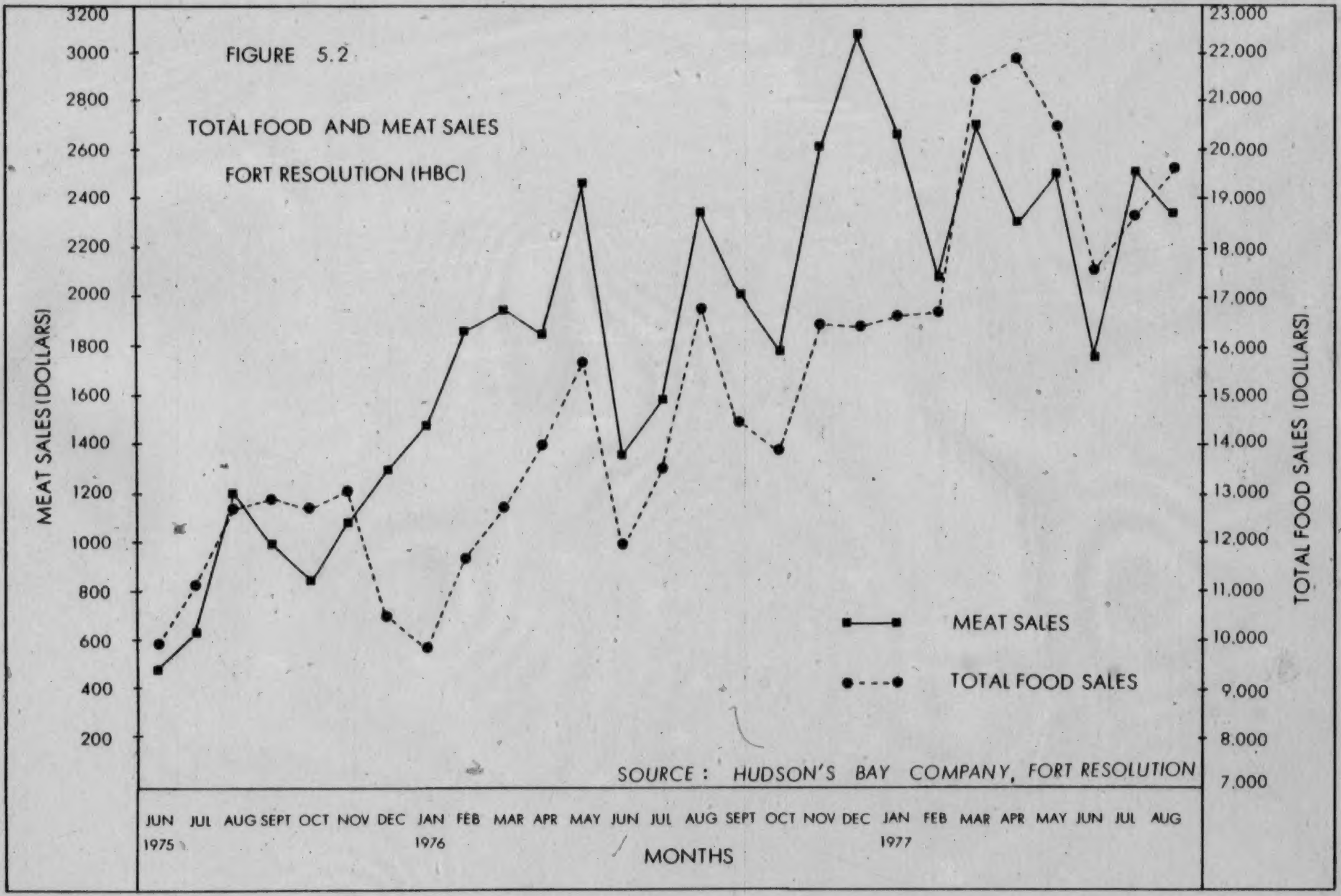

FIGURE 5.2

TOTAL FOOD AND MEAT SALES
FORT RESOLUTION (HBC)

SOURCE : HUDSON'S BAY COMPANY, FORT RESOLUTION country food in the spring appears to be more pronounced than in the fall because wage employment opportunities are fewer in the winter and country food production is at it lowest in late winter. Eleven of the thirteen families interviewed by Stiles stated that they harvested food from the land and use country food as an important part of their diet (Stiles 1972). Game products were most important, followed by fish and natural plant and egg material which made a minor contribution.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

Prior to contact with whitemen in the the early nineteenth century, the natives of the Great Slave Lake area were semi-nomadic, subsistence hunters dependent on a variety of animal species, including large and small game and fish. With the encroachment of the fur trade from the east and south in the 1800's their lifestyle became modified. No longer was their's a wholly self-contained society dependent on their own efforts for survival. The establishment of trading posts on the south shore of Great Slave Lake including Fort Resolution encouraged their participation in the fur trade and eventually led to a gradual but growing dependence on trade goods. The desire for trade goods meant the development of an exchange system, including a monetary system. Trapping and its monetary rewards became increasingly important, eventually competing with local subsistence activities in importance by the 1920's.

As a result of this new economy and its accompanying government, their lifestyle became centred around the trading post. Summers were spent near the post in relative inactivity, occasionally fishing to feed themselves and their dogs. Fall required a move to the bush camps for the fall muskrat trapping and fishing for winter dog food. After freeze-up, nets were set under the ice and 'rats' were trapped in their pushups or houses. November to Christmas was a period of intense trapping activity, when the more valuable mink, beaver and long hair fur-bearing animals were harvested. Religious holidays were spent near the trading posts with family and friends and little time was spent on subsistence activities until spring break-up. The spring ratting season provided a valuable and much needed meat supply and cash for the coming summer.

The decline of the importance of the subsistence sector was the result of a number of external factors. Fort Resolution was the main trade and transportation center on Great Slave Lake and wage employment opportunities became an important source of supplementary cash for native peoples. Subsequent to the crash in the fur trade in the mid-1950's, the trading posts became more involved in retail trade. This led to a greater exposure to manufactured goods.

Family units traditionally based in the bush camps began to spend more time in the community, especially after education and health facilities became established. The introduction of welfare payments, family allowances and other government assistance such as housing, schools and medical facilities continued to erode the traditional bush-orientated activities. The need for cash to accommodate their increased aspirations for manufactured goods and the attractiveness of warm housing and community services meant that former harvest areas were used less frequently and harvest activities became more concentrated in the vicinity of the community of Fort Resolution.

The decline in the trapping economy was believed to indicate that subsistence hunting activities had also declined and were of little importance to native populations. These assumptions ignored the important role that natural resource harvest activities played in providing country food to the native peoples. The inadequacy of conventional economic measures as they relate to country food and the lack of information on the levels of subsistence activities only served to highlight what was assumed to be the poor economic condition of Fort Resolution.

6.2 Hypotheses

One of the hypotheses to be tested was that the natural resources harvested from the Slave River Delta area for food and clothing constituted an important contribution to the well-being and welfare of the native peoples of Fort Resolution. The natural resource harvests recorded in interviews with the majority of the native households in Fort Resolution demonstrated that country food production does contribute significantly to the local economy. This is true on a community basis but may not represent conditions in individual households. Many of those active in wage employment opportunities view hunting/fishing/trapping as a recreational pursuit that is followed on the weekends and holidays. Depending on the resource base available the contribution of subsistence activities to the family income is extremely variable, ranging from a few dollars to more than a thousand. Averaged household incomes may also understate the importance of natural resource harvesting. A number of families rely heavily on country food (meat and fish) to the exclusion of commercially available products.

The second hypothesis tested was that resource activity in the Slave River Delta area is concentrated in periods of resource abundance. Harvesting activity in the delta is concentrated in the two four-week periods around spring break-up and fall freeze-up. The local concentrations of resources, particularly fish and muskrat populations, appear to be the main reason for this concentration of activity. When the fall or early winter spawning runs enter the delta large numbers of fish can be taken with a minimum of effort. During the open water periods of the muskrat season, activity is also particularly high, as rats can be shot as well as trapped, increasing the individual opportunities for successful harvest. Similar conditions also hold for the staging waterfowl during the same period.

The likelihood of a successful resource harvest from the delta during the spring and fall attracts a large number of residents from Fort Resolution. Resource harvest activities are more attractive during these times as success is not as strongly determined by the knowledge of bush skills or proper equipment. Economic factors such as low fur prices do not seem to deter natives from participating in the harvesting of resources from the delta. As indicated above, there are additional reasons relating to a traditional lifestyle incorporating food type and source and the cultural link to the land, which encourage the people to engage in subsistence activities.

The last hypothesis to be examined in this thesis was that the heavy pressure exerted on the wildlife populations of the delta would affect their numbers, especially during cyclical periods of low numbers when overharvesting would prolong the buildup of healthy stocks. Evidence collected only partially demonstrates this, with the delta's muskrat population recovering very slowly from the dramatic drop in numbers during the winter of 1976-1977. Continued hunting and trapping pressure after the crash virtually eliminated the animals from the main channels and the remaining breeding populations in the few lakes of the delta were trapped out. This unregulated harvest of animals at a low point of their cycle appears to have kept their numbers at a low level.

The other main source of red meat, moose, does not appear to be seriously affected by hunting pressure. Whenever local populations are thinned out by hunting, recruitment from surrounding areas appears to replenish the delta's population. Hunting success appears to be determined by weather conditions and hunting techniques rather than the size of the resource base.

6.3 Conclusions

Although it is not within the scope of this study to speculate on the importance of resource harvesting activities in native communties other than Fort Resolution, a number of observations can be made that may be applicable to other native communities in northern Canada. Fort Resolution has been exposed to opportunites to engage in the wage employment sector since the turn of the century. The community has experienced characteristics of boom and bust economies, in particular the fur trade and river transportation. How the community has adjusted to these economic changes can be used as an example for other communities in the North. Despite the opportunity to engage in wage employment locally or in adjacent south shore locations, the native population of Fort Resolution has managed to develop a local economy that blends wage employment, transfer payments and subsistence hunting/trapping/fishing activities. Following a history of exposure to the advantages and disadvantages of development, the natives of Fort

Resolution have attempted to and appear to have maintained, a close and economically viable contact with their natural environment and its resource base.

6.4 Limitations on Data

The harvest data collected by the interviews represent the most recent and comprehensive information on natural resource harvesting activities in Fort Resolution. Despite the advantages of the data compared to previous attempts, it should be noted that certain limitations must be place on this information.

The natural resource production of the Slave River Delta was examined during the period between July 1975 and July 1977. During this two year period muskrat populations peaked and began a decline, the numbers of snowshoe hare appeared to have peaked and ptarmigan flocks were concentrated in the vicinity of the delta and community in the fall of both years. The great abundance of game in the study area may not be representative of the resource base in preceding or following years. Populations fluctuate cyclically from year to year. The length of stay of migratory birds depends on weather conditions and the timing of break-up or freeze-up. Ptarmigan flocks may not pass through the delta for years at a time. The variability of the natural resource base from year to year makes it difficult to determine a long-term average resource harvest pattern or production level based on two years of observations and collected data.

The ability to duplicate the information collected in this study or to compare the information to other communities is a dubious task for a number of reasons. The main complicating factor is the variation in the composition and mix of the resource base for any given year. The need to rely on memory to record harvest levels also reduces the ability to duplicate results. Existing records are sketchy and the General Hunting Licence records are totally inadequate as a measure of game use.

6.5 Implications of Development

6.5.1 Introduction

This study has identified a healthy natural resource harvesting sector in the community of Fort Resolution centered upon the resources of the Slave River Delta. This sector does not appear to be seriously affected by outside factors such as the attractiveness of wage employment or government transfer payments. Rather, it appears to be governed more by internal factors such as the mix of the animal resource base. Despite declines in some of the populations in the resource base, the natives of Fort Resolution have adjusted harvest techniques and put pressure on alternative resources.

This apparently stable resource sector is being threatened indirectly by a number of future industrial developments south of Great Slave Lake that have the potential to affect the natural resources of the Slave River Delta.

6.5.2 Hydro-Electric Developments

6.5.2.1 Introduction

Calgary Power has proposed a dam on the Slave River at Mountain Rapids, ten kilometers south of the Alberta/Northwest Territories border. Such a development would alter the natural regime of the river and subsequently alter the socio-economic conditions existing downstream, and in particular, the Slave River Delta.

Based on the most economical and maximum use of water resources, a dam will be constructed to maintain a mean water level of 209.1 m.a.s.l. [25] Environmental effects would result from the initial impoundment of water, altering the flow of the Slave River and influencing suspended sediment; and the long-term modification of the flow regime. Based on an Edmonton market for the generated power, peak reservoir capacity will be prior to freeze-up to allow maximum winter drawdown and power generation. Peak discharge of the Slave River during the spring flood will be used to recharge reservoir capacity.

6.5.2.2 Short-Term Effects

In order to create the necessary reservoir as quickly as possible the discharge below the dam will have to be drastically reduced with the most significant reduction occurring during peak flows. The loss of the spring flood waters will affect the climate of the delta, lowering temperatures and delaying phenology or bud-burst. The low discharge below the dam prior to fall freeze-up will promote widespread freezing and create icings in the flood-plain. Successive freezing of overflows will result in heavy ice buildup and will prolong break-up. The removal of ice in distributary channels and on the flood plain by the surge of water associated with spring flooding will be hampered because of the retention of peak flows.

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[25] Meters above sea level.

Ecological conditions will be similar to those experienced in the Peace-Athabasca Delta when the Bennett Dam was closed (Howell 1978). Lower water levels will allow successional processes to become established. The reduced discharge created by the filling of the reservoir will also affect the wildlife resources of the Slave River Delta. Muskrats need a minimum water depth of 1.3-1.6 meters (4-5 feet) to survive during the winter and reduced water levels will reduce available winter habitat. Migratory waterfowl staging and resting at the delta will also experience reduced habitat and delayed break-up. Low water levels may also affect fall spawning runs of whitefish, inconnu and cisco. The accessibility of distributary and interlevee channels to northern pike spawning in the spring will be restricted by lower water levels. The delayed break-up will also affect the timing of the northern pike spawn. Burbot populations spawning in the winter months will not be seriously affected.

6.5.2.3 Long-Term Effects

The operation of the dam based on the peak demand for power during the winter will result in reduced spring discharge levels and maximum reservoir drawdown during the winter. The resulting loss of flood waters will allow successional ecosystems to mature, increasing riparian vegetation at the expense of aquatic varieties. Reduced suspended sediment load due to settling in the reservoir will create downstream channel degradation and reduced sandbar development (English 1979). The delay in spring break-up will prolong winter conditions and eventually reduce the biological productivity of the area.

The altered flow regime of the Slave River will have a negative impact on the area's muskrat population. Fluctuations in discharge during the winter will create unstable ice conditions. Suitable winter habitat will be reduced because plunge holes will be hard to maintain in areas of fluctuating water levels. Reduced littoral vegetation will also mean reduced habitat for the young emergent waterfowl population of the delta. Moose habitat will increase in response to increased riparian vegetation, especially the willow communities. The development of more climax spruce stands will also support larger squirrel, marten and lynx numbers, although the increase is expected to be minimal.

Navigation throughout the delta will become restricted to the deeper main channels and additional portages will need to be constructed to reach areas formerly connected by waterways. Winter travel on channel ice will be more dangerous because of the fluctuating water levels.

6.5.3 Lead-Zinc Mineral Development

6.5.3.1 Introduction

Pine Point was established sixty-six kilometers west of Fort Resolution in conjunction with the development of the large open pit lead-zinc mine of the same name in 1964. The mine and its potential employment opportunities, were expected to help alleviate the poor economic situation in Fort Resolution. Although there was an available unskilled labour pool in Fort Resolution, with almost fifty percent of the population on welfare (Fields and Sigurdson 1972), the Cominco operation failed to attract a significant number of workers. Poor hiring practices, the lack of a road to Fort Resolution and the lack of adequate housing in Pine Point all contributed to this situation.

Despite the construction of a all-weather gravel road between the two communities in 1974, the employment picture still remained poor. A stigma exists about working at the mine as the natives of Fort Resolution believe that the operation is responsible for the pollution of Great Slave Lake, for poor community health conditions and for degradation of the land west of Fort Resolution.

6.5.3.2 Present Conditions

Animosity exists toward the Pine Point operation as few benefits are perceived to accrue to the residents of Fort Resolution. Of a mine labour force of over six hundred, only three percent were residents of Fort Resolution in 1977. Only seven of the fifteen natives hired in 1977 remained more than six months (Macpherson 1978). The degradation of the land around Little Buffalo River and the increased recreational use of the area by Pine Point residents has forced the abandonment of a number of traplines in the area. Dewatering of the deep open pits has been blamed for the large die-off of the spruce forests within twenty kilometers of Fort Resolution. Plans for exploration of new lead-zinc properties closer to Fort Resolution have raised fears of further environmental degradation should development proceed. Expansion of mine production towards Fort Resolution may not affect the resources of the Slave River Delta directly, but the degradation of resource areas to the west will increase pressure on the delta's resources.

6.6 Recommendations

Hunting/fishing/and trapping provide cultural, economic and social benefits that make them attractive to many natives despite the heavy workload associated with them. The ability to pursue these activities must be maintained by and for the native population of Fort Resolution. The choice of these activities as full time occupations has diminished but access to bush resources and the skill levels necessary to harvest them must be maintained. Therefore, the present emphasis on bush skills in the education system in Fort Resolution should be continued. The participation of the active members of the Hunter's and Trapper's Association in designing and assisting the courses should continue to be encouraged.

Access to the resources of the Slave River Delta should be kept open to all the residents of Fort Resolution. Registered traplines must continue to be restricted from the study area. The proximity of the delta to Fort Resolution and its high natural resource productivity make it attractive for the recreational aspects of resource harvesting. The use of the area by natives from other communities must continue to be closely monitored and regulated by the local Hunter's and Trapper's Association.

Although restrictions on the use of the delta by the local residents should be avoided, some form of control should be considered when dealing with the cyclical muskrat population. The heavy harvesting pressure on this resource during low cyclical periods must be suppressed by the local hunters and trappers. In order to allow numbers to increase quickly, the prime wintering habitats must receive some protection. Restrictions on numbers taken, and closures of specific areas should be considered and set by the Hunter's and Trapper's Association. The power to regulate local conditions must be delegated at a local level to ensure community cooperation. Residents must be aware of the importance of this resource and its relationship with the delta and how the community economic structure benefits from a healthy resource base. Effective conservation and protective measures must emerge from a Local concern for the community well-being. The existing institutional structure, the Territorial Game Branch, should be approached and consulted in regard to existing regulations. Should the population of Fort Resolution increase to the point where the resources of the delta cannot support the accompaning harvesting pressure, local management by the Settlement Council or Hunter's and Trapper's Association of the delta's resources should be examined.

Periodic surveys do not provide sufficient information to provide a complete scenario of the subsistence resource harvesting sector of a community. Government resource harvest information is inadequate and has very limited applicability as a management tool. In order that mitigative measures can be incorporated into the planning of hydroelectric projects on the Slave River and to enable rapid and equitable adjustments to be made should problems arise, the community of Fort Resolution needs to adopt a long-term detailed information collection system similar to that used by the James Bay and Northern

Quebec Cree. The heavy participation of most, if not all, of the residents will be necessary to complete such a project. The local Hunter's and Trapper's Association members should take the initiative to seek the support of the Territorial Game Branch in establishing such a program.

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APPENDIX I

APPENDIX I

8.1 Research Methods

This study used three different information collection methodologies; observation, interviewing and document search. The following discussion analyses each method and describes the advantages and disadvantages of each.

8.2 Observation

Observation is the purposeful and selective watching and recording of phenomena as they occur (Webb et al. 1969). Phenomena are usually limited to linguistical signs or physical acts. Behavioral determinants such as attitude and motivation can only be interpretated indirectly and not directly recorded (Loftland 1971).

Observation skills are possessed by most individuals, yet, skilled scientists' observations differ from the common place in that they are often controlled by their research objectives and methodology.

Observation techniques are ideally suited for smaller populations and are invaluable in the investigation of human behaviour in the context of small communities (Moser 1969). However, technique limitations must be identified to ensure the adequate collection of information. Suitable techniques, free of controllable bias, should be selected from those suitable to the studied population (Becker and Geer 1960).

8.2.1 Types of Observation

8.2.1.1 Direct/Indirect

Direct observation is the act of observing and recording an event first hand. The data base includes primary and secondary information; primary information is collected and used by the observer, while secondary refers to information collected by others.

The potential for the greatest error from collected types of information is from indirect secondary sources such as newspapers and memoirs. Two common sources of error are information sources for newspapers which are rarely made explicit while imperfect memory seriously affects the value of autobiographies and journals produced some time after the fact (Sjoberg and Nett 1968).

Physical trace elements are another method of indirect observation, using elements remaining from past activities. An example of investigations using this particular method is the study of animal habitat use (Eberhardt 1971). Electronic and mechanical recording devices provide additional indirect information for detailed observation on human behaviour after the event has passed. Cameras and tape recording devices are commonly used in ethnography studies (Mosby 1969).

8.2.1.2 Participant/Non Participant

Participant observer research is often characterized by prolonged periods of intense social interaction between the researcher and the subjects, in the milieu of the latter (Bogdan 1972). Observer roles are extremely variable, from being the principal character to the other extreme, the detached observer. A large range of roles may need to be assumed to obtain necessary information (Katz 1966). Roles assumed depend on the observer's acceptance within the community, and often requires that the observer be exposed to the event for a prolonged period to be able to fulfill the full range of roles (Rogers 1973; Van Stone 1963).

Of the advantages of participant observation, the most obvious is that the observer can participate in the every day life of the people and situation he wishes to understand and sees the world as the subjects conceive it (Bogdan 1972). The open ended character of this approach to the study is facilitated by the closeness of the observer to his study, both system and study being influenced by the same factors, creating a potential for change. Extensive information can be collected because of the long time periods taken for the observation (Honigman 1961). Observation also avoids error caused by exaggeration, prestige effects, and memory failures. Finally, especially in areas where subjects are unwilling to provide information through other techniques, observation can be used. Inherent to the direct observation approach are the following disadvantages: local populations become sensitized and role playing influences the results. Human behaviour is potentially affected by the observer, as he intrudes as a foreign element in the social setting, creating attitudes and eliciting atypical roles and responses (Bogdan 1972). Observation can not be carried out continuously or for an entire population thus random selection for observation is necessary. Under these conditions it is extremely difficult for another researcher to duplicate results.

Role playing is a common source of bias, the researcher can lose his objectivity by becoming one of the boys or by "going native " (Gold 1958). Observer bias is critical, as the usual measuring device in observation techniques, is the human observer. Bias may be imposed with or without intent. In addition the creditability of the study can be eroded by changing observation processes (Burton 1970). This has led to attempts to reduce or eliminate bias which have had some success when systematic observation checks have been employed.

8.2.1.3 Simple/Systematic

Simple observation is undertaken with no form of control or structure, observations being made in a random manner. Systematic observation, on the other hand, uses a standardized process for making observations. Two external checks used to minimize human observer error are; multiple observers and hidden or anonymous observers, or the questionable misrepresentation of the role of the observer, can be used to reduce the chance of atypical behaviour and responses by hiding the true intent of the research (Burton and Cherry 1970).

8.2.1.4 Structured/Unstructured

Structured observation is used when specific activities and observations are to be recorded, remarks being modified to fit into predetermined categories. Rigidity in categories is reduced in unstructured observation, allowing for information to retain some of its local attributes. Structured techniques allow for repetition of the process in other areas and comparison of results. With these two types, creation and testing of theories on human behaviour patterns are possible.

"To study a sequence of events, the events that precede and follow them, and explanations of the meanings of the events by the participants . . . observation (especially participant observation) seems to be the best method of data collection" (Becker and Geer 1960). "Observation appears to be as good as any method developed. The participant observer is a scientist in that he uses all suitable means and develops any ethically responsible techniques that might be needed to expand his understanding of what he is studying" (Bogdan 1972: 7).

8.3 Interviewing

Interviewing is a device for the collection of data required to test hypotheses in social research (Cannel and Kahn 1957). Friedrichs and Ludtke (1975) suggest that to gain a form of control as well as additional information, a phase of interviewing can be included along with observation techniques. The forms of survey conducted range from a more or less complete statistical count (census) to the more common random sample.

8.3.1 Types of Interviews

8.3.1.1 Guides/Schedules

Most interviews are accompanied by either an interview guide or schedule. Interview schedules are an observation instrument comprised of a series of questions that are asked and filled in by an interviewer in a face-to-face situation with the respondent, in a natural setting (Labovitz and Hagedorn 1971), The guide consists of a series of unstructured questions on general topics that are asked of or completed by an interviewer.

Reasons for receiving a response from the respondent vary for each individual interview. They can usually be expressed as either an opportunity for the respondent to talk about topics in which he is interested and has some knowledge or the respondent perceives the interviewer as one who can bring about change as a result of information collected in the conversation. In order to encourage a favourable response it is important that the respondent have some knowledge about the problem being studied, the researcher's objectives and that the information will be kept confidential. Development of rapport between interviewer and respondent encourages a greater degree of cooperation.

Advantages of interview techniques are a high response rate, past performances and experiences are obtainable, and perceptions and opinions can be secured. The more private and confidential the information, the greater the accuracy needed, which suggests that the more appropriate approach is an unstructured interview. During the course of the interview, clarification of ambiguous statements or misunderstandings allows for a more complete coverage while previous experiences and performances can be discussed. Unlike observation techniques, interviews have the potential for exposing human behaviour determinants of motivation and attitude through the expression of individual perceptions and opinions (Cannel and Kahn 1957).

As was the case with observation techniques, the subjects of an interview can be sensitized, providing the interviewer with atypical responses or faulty information to conform to their perceived needs for the study. Faulty memory is another problem common to both techniques. It is rare for a survey to have a 100 percent response. The significance of the non-response factor may be critical to the conclusions that can be drawn from the information collected. Problems of data bias resulting from information being deliberately held back can be common.

Compiled information and behavioural attributes perceived by the interviewer can differ from actual fact. Finally, the respondent may not be qualified to answer the interviewer's questions, not having the necessary knowledge or expertise (Labovitz and Hagedorn 1971).

8.3.1.2 Non-structured/Structured

There are two extremes of types of interviews, from the highly flexible non-structured to the rigid structured form. Structured interviews allow for a limited number of explicit responses from which the respondent can choose (Burton and Cherry 1970). Questions are phrased with the same wording and sequence on the schedule, using closed questions and allowing for little response variation. Electronic recording (tape recorders) or multiple note takers are often used to keep response uniform. However, Lin (1976) expressed the fear that excessive note taking in situ or the use of recording devices could be disruptive to the flow of information.

Unstructured interviews utilize open questions, relying more on the respondent's words, allowing the respondent to provide information and an accompanying statement of frame of reference. If highly emotional or ego related information is required, acceptance and rapport have to be developed to gain access to such information (Moser 1969).

Highly structured interviews record only specific events or responses. Information collected from each respondent is the same, the differences being attributed to the individual differences in respondents. Interviewer bias can also be reduced using this method. Structured interviews are best suited to homogenous populations or samples from which factual information can be collected. Questions are usually phrased in language understood by the lowest common denominator, which provides reliable results, suitable for testing hypotheses. Semi-standardized interviews differ in that the questions can be phrased and ordered in a manner suitable to each individual respondent. Order and wording are not important as long as the meaning is the same. Non-structured interviews make no attempt to obtain the same information from those surveyed.

8.3.1.3 Guided/Non-directive/Casual

Three commonly used non-structured interview forms are; guided or focused, non-directive, and conversational or casual. Guided interviews try to focus attention upon a particular set of topics or experiences. The interviewer introduces this set of topics with factual, open, unrestricted questions. Freedom gained from the lack of formality allows a wider view of attitudes to be examined "in depth." By progressing from general questions to specific or by "funneling" his questions, the interviewer can modify his approach to suit each subject.

Non-directive interviews encourage the respondent to talk about topics or experiences in which the researcher is interested. Both mood and pace of the interview are set by the respondent, the conversation being one-sided and stimulated by general probes from the interviewer.

Points or remarks in doubt are elucidated by the subject. When the interviewer's knowledge of local conditions is vague, especially in the early stages of research, valuable background knowledge can be gathered this way.

Casual interviews lack any form of structure or control, the conversation being completely controlled by the respondent. The lack of checks on either questions or recorded response, increase the chance of error and also increase the potential for personal bias (Loftland 1971). Barriers such as embarassment and emotional inhibitions, can be reduced using the informal methods. With casual interviews a major drawback is that validity and reliability is reduced, and additional costs in time and money are often required.

In any particular study a number of interview forms can be used. Interviewers may shift from standardized to the less formal forms depending on the nature of the information required (Burton and Cherry 1970).

8.4 Document Use

8.4.1 Introduction

Document use has traditionally been employed by researchers in conjunction with observation techniques (Moser 1969). For the purposes of this study documents will be defined as any written material used as a source of information about human behaviour (Webb et al. 1966). They can include collective public documents which were produced by government departments, records of private companies and businesses, and the personal writings of individuals from all walks of life.

Reliability of the written records used is often suspect, requiring that they be internally tested before they can be used for research purposes. This consists of asking the questions: who wrote the document; when was it written; why was it written; and the eventual purpose of the document. However, even after this process is completed, true verification of the document's accuracy may still be lacking. Peer pressure or government regulations may effectively restrict the establishment of the true situation. The writer may not want to report the truth, expecially in cases when the subject matter deals with socially unacceptable behaviour such as hunting outside regulated time periods (Barry 1973; Usher 1975b; Berger 1977). Written reports may be deliberately distorted to misrepresent the actual situation or the falsification may be unintentional. To some extent in such situations external collaboration can be provided by interviewing or observation techniques.

8.4.2 Written Historical Records

Written records provide the social researcher with the only means of following a given subject through long time periods. This particular source of information has the added advantage of potentially providing information on more than one location. Material can be particularly useful when it has not been solicited, with the writer being unaware of the eventual use of the information.

Disadvantages of this type of information source are that motives, attitudes, and opinions are not available or at best interpreted as second-hand and the material may be recorded in a manner which may intentionally and unintentionally deceive the researcher.

8.4.3 Continuous/Discontinuous Records

The advantages and disadvantages of indirect and direct information sources have been discussed in sections 8.2.1.1. Another distinction in written documents is between continuous and discontinuous records. Continuously kept documents are easy to sample from, inexpensive to obtain and population restrictions are usually known. The researcher has the opportunity to study a problem over time and to identify potential trends with continous records.

Discontinuous records are kept at irregular intervals and many include personal memoirs and institutional records. The contents of this type of document tend to be more specific but are often hard to obtain. Problems arise when the selection processes and research theories are unclear.

APPENDIX II

APPENDIX II

OBSERVATION/INTERVIEW GUIDE

TIME

OF OBSERVATION

DURATION OF OBSERVATION

DURATION OF ACTIVITY

WEATHER CONDITIONS

PARTICIPANTS/HOUSEHOLD/FAMILY UNIT

NAME	AGE	SEX	

PLACE

LOCATION IN DELTA

HABITAT DESCRIPTION

UTILIZATION

#			LIVE	CARCASS		HUMAN USE		ANIMAL USE		WASTAGE	
75-6	76-7	SPECIES	WEIGHT	Kg	%	Kg	%	Kg	%	Kg	%

APPENDIX II

		Q				WEIGHT (KG)			
EQUIPMENT	SPECIES	75-6	76-7	AGE	SEX	75-6	76-7	LENGTH	METHODS & COMMENTS
HUNTING	Moose								
	Bear								
	Ptarmigan								
	Grouse								
	Ducks								
	Geese								
	Rats								
	Rabbits								
FISHING	Trout								
	Whitefish								
	Maria								
	Pike								
	Cony								
	Walleye								
	Suckers								
TRAPPING	Beaver								
	Bear								
	Rats								
	Mink								
	Marten								
	Fisher								
	Lynx								
	Rabbits								
	Squirrel								
	Weasel								
	Coyote								
	Wolf								
	Fox								
HARVESTING	Wood (Cords)								
	Berries								
	Plant Matter								

APPENDIX II

OBSERVATION/INTERVIEW GUIDE

PURPOSE OF PRODUCE

COMMENTARY

LOCAL EXCHANGE RATE?

PERCENTAGE OF TOTAL FOOD SUPPLY FROM BUSH?

PERCENTAGE OF TOTAL FOOD SUPPLY FROM DELTA?

PRIMARY OCCUPATION?

CONSUMING PREFERENCE?

TRAPPING AND HUNTING LOSSES?

PRODUCTION FOR SALE?

APPENDIX III

APPENDIX III

10.1 Regulations Affecting General Hunting Licence Holders

Holders of General Hunting Licences are subject to the following eligibility criteria and harvesting restrictions established by the responsible territorial and federal departments.

10.2 Eligibility

-an Indian or Eskimo who has resided in the territories since his birth and has not resided outside longer than 10 years;

-an Indian or Eskimo who is a member of a family or a group that prior to June 30, 1953 hunted in the territories;

-a non-treaty or of mixed blood who is a member of a group that prior to June 30, 1953 hunted in the territories;

-a Canadian citizen who held a valid Northwest Territories hunting and trapping licence on May 3, 1938 and who, since that date, has not been outside the territories for a period longer than 10 years;

-any person, if one of his parents resides in the territories and is, or in the case of a deceased parent, was resident in the territories and immediately prior to death, was the holder or eligible to be the holder of a General Hunting Licence and he has not resided outside the territories for a period longer than 10 years.

10.3 Restrictions

A General Hunting Licence permits the holder to hunt game, including fur-bearing animals:

10.1d -Barren Ground Caribou -any number, sex, age or size (July 1 to June 30);

10.2c -Woodland Caribou -any number, sex, age or size (July 1 to June 30);

10.5d -Moose -any number, sex, age or size (July 1 to June 30);

10.9d -Black Bear -any number, of any sex and that is not accompanied by a cub (July 1 to June 30);

10.11d -Hare (all species) -any number, no possession limit, any sex, age or size (July 1 to June 30);

10.13d -Red Squirrel -any number, no posession limit, any sex, age or size (dates set by Fish and Wildlife Service, NWT);

10.15d -Ptarmigan and Grouse -any number, no possession limit, any sex, age or size (July 1 to June 30).

10.16 -Migratory Game Birds -as set out in the Migratory Birds Convention Act (Canada).

Fur-bearing species such as wolverine, beaver, ermine, fisher fox, lnyx, marten, mink, muskrat, otter, squirrel and wolf have open trapping and hunting seasons which are set by the Fish and Wildlife Service, NWT.

10.4 Reserves

Hunting in game preserves is permitted if:

A holder of a General Hunting Licence who is the child or the wife or widow of a person who is now, or was before his death, eligible to hunt in a wildlife preserve, if such holder is dependent on hunting for his livelihood, may hunt in that wildlife preserve in which his parent is, or was before his death, eligible to hunt;

A holder of a General Hunting Licence who wishes to hunt for food for himself and his dependents, game other than; a/ migratory birds, b/ musk-ox, c/ polar bear, d/ grizzly bear (Government of Northwest Territories 1977a).

10.5 Migratory Game Birds

The Migratory Birds Convention Act places the responsibility of protecting and managing migratory bird populations under the jurisdiction of the federal government, or the Canadian Wildlife Service. Special open seasons for ducks, geese, rails, coots, gallinules and Wilson's snipe are set each year according to population numbers. Daily bag limits and possession limits are set in the regulations and hunters are required to purchase a migratory game bird hunting permit. General Hunting Licence holders are subject to the following restrictions:

-daily bag limits are set in the migratory bird regulations for each year;

-no possession limits are in force for General Hunting Licence holders;

The following groups may hunt migratory game birds without a migratory game bird hunting permit:

-an Indian or Inuk may, in any area in Canada;

-a resident of the Mackenzie District of the Northwest Territories who is a holder of a General Hunting Licence issued under the Game Ordinance of the Northwest Territories may within that district;

-any person may, in the Franklin or Keewatin District of the Northwest Territories.

A special clause in the Migratory Birds Convention Act allows that an Indian or Inuk may at any time, without a permit take auks, auklets, guillemots, murres, puffins and scoters and their eggs for human food and clothing (Canada, Environment 1976).

10.6 Fishing

Settlements on Great Slave Lake have an area within a ten mile radius of the community that is reserved for domestic fishing. Commercial fishing is banned from the area and the commercial regulations regarding equipment and quotas are not applicable in the zone. Treaty Indians, Metis and all other inhabitants are free to harvest within the protected zone without licensing. Most of the equipment available is designed to comply with the commercial regulations, so that much of the equipment used in Great Slave Lake is similar, whether commercial or domestic.